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LEVI COOPER LANE FUND

A Treatise
(*Illustrated*)

on

Actinic-Ray Therapy
for physicians interested in Physical Therapeutics

by

T. Howard Plank, M. D.

Brown Press
1922

NP

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1922

This book is dedicated to
my mother, whose life
has been an ever-present
inspiration to me.

The Author.

54826

Preface to First Edition

I HAVE with much trepidation undertaken to write a book on the therapeutics of actinic rays.

First, I wish to disclaim any idea or thought that I am even attempting to add to the scientific knowledge of the physics of actinic rays—I have neither the time nor the money to do this—but I am trying and using every means at my command to add to the present knowledge of the therapeutic uses of these rays.

The first criticism I expect will be that I am empirical, and I am going to admit this now to avoid argument—but, however, with the counter-query: What therapeutic measure has the medical profession today that did not originate in an empiricism?

The criticism is frequently made of those who write on new subjects that they do so before the subject has been put upon a scientific basis; but were all thoughts withheld until they were proven scientific facts, progress in the medical world would be slow indeed. I am not stating as fact that which is uncertain; but in the following pages I am giving such facts as I now possess, the deductions I have drawn from those facts, and the advanced ideas which now appear to be conclusions, and I hope to put them into such form that others may add to them in the coming years, and with the hope that in the near future actinic-ray therapy will be put upon a strictly scientific basis.

The scientific statements regarding the physics of actinic rays given in this book have been drawn from the best available sources at my command, and to each I have given due credit.

It has been my desire to go more deeply into actinic-ray physics through the scientific researches of Mme. and V. Henri, but these writings are in French and thus far I have been unable to obtain an authoritative translation, so must postpone this for a future edition.

The cases reported herein are taken from my case records. The numbers on the cases reported are the same as the numbers on the history sheets, and these are open to the inspection of any member of the medical profession who is interested.

I am quoting as completely on these cases as seems necessary to convey to the user of these rays just how I use them in treating my cases, so that he may use these reports as a guide. No two cases of the same disease are alike, and no two cases can be treated alike. Common sense, keen observation, and a scientific medical education are necessary to obtain the best results with these rays. I use everything that I can read about, hear of, or see that is of advantage to sick humanity, and due credit should be given to these measures when studying the following pages. I have purposely left out most of these adjuvants, for I am writing a book on actinic rays and not a complete treatise on the practice of medicine.

Etiology, symptomatology, pathology, methods of diagnosis, and prognosis have likewise purposely been omitted, as others have written fully on these subjects and still others are keeping them up-to-date through the agencies of books, journals, etc.

I am just as anxious to know the true value of actinic rays in therapeutics as is every other member of the medical profession; so I shall be grateful for any criticisms, adverse as well as favorable, and for any new facts or ideas that may come to any one who uses actinic rays or reads these pages, and, if I find such suggestions or ideas to be true, due credit will be given in future editions.

In short, actinic rays are an adjuvant, not a complete treatment for every disease quoted, although for many diseases they are all-sufficient.

T. HOWARD PLANK.

CHICAGO, ILLINOIS,
April, 1919.

Preface to Third Edition

THE *Second Edition* of Actinic-Ray Therapy being exhausted within a year after publication, it becomes necessary to publish a *Third Edition* to meet the demands of the medical profession. This edition has been rearranged and the index corrected, making the contents more available.

I regret that lack of time has made it impossible to rewrite the entire book much as I desire to do so. However, the reader may be assured that material is being gathered for an edition which will not only contain actinic-ray therapy but all other means used by the author in the treatment of the various diseases.

I desire to thank the medical profession for the kindly spirit in which they have accepted my various writings on the subject of actinic-ray therapy.

T. HOWARD PLANK.

CHICAGO, ILLINOIS,
November, 1922.

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This chapter contains one hundred questions which are constantly being asked about these rays. Each question is answered in a definite manner.

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FORECAST

THIS book has been written in the hope that it may in some small measure be an aid and a guide to practitioners of medicine who are interested in physical therapeutics, and as a means of awakening those who are not.

Physical measures have always been an aid in maintaining or regaining health, but, until the past generation, they have been in the hands of the non-medical, where, for lack of a foundational education, they have frequently been abused. However, even in crude hands, much good has been accomplished—enough so that the public are demanding more and better service along these lines; and none are so well equipped to use physical therapeutic measures as the physician.

We say this advisedly, for even though he may know but little of physical means of healing the sick he is grounded in anatomy, physiology, and pathology, and with these it takes but a short course of study in physical measures to equip him with an armamentarium more valuable than the average practitioner appreciates. The public have grown tired of being drugged and told that nothing more can be done for them. Suffering humanity, like the drowning man clutching at a straw, reaches out for any measure that gives hope of relief if not of cure, and when physicians refuse beneficial physical measures they have only themselves to blame if they compel the public to seek aid of the non-medical.

Physical measures have been scientifically proved to be beneficial and many times curative, as much if not more so than drugs. Why, then, should any one sneer at them and refuse to investigate? Physicians should be leaders in investigating agents beneficial to the public health; sometimes they are not. Preventive medicine is coming into its own, but, even so, curative measures will be in demand for many generations to come. We trust the pendulum will not swing too far and deprive humanity of beneficent measures now known to alleviate suffering and many times to stay the ravages of disease.

Who shall administer these curative measures? Who shall say which are curative? Think a moment; are you neglecting a single measure which might aid those who repose in you their full confidence? Physicians of the past were true confidants of those who confided in them; they gave their best. And through this slight contribution the author hopes and trusts that phototherapy may be moved forward a step nearer to the goal of scientific therapeutics.

CHAPTER I

PHYSICS OF ACTINIC RAYS

THE use of actinic rays is both old and new. So long as the earth has been, there have been actinic rays with their health-giving properties. Those coming from the sun meet many obstacles on their journey to the earth's surface, for dust, smoke, and fog are opaque to them.

Sun baths are as old as history, for the Egyptians treated various diseases by exposing their patients to the sun's rays; but only in recent years has man endeavored to get a pure actinic-ray bath by going above dust, smoke, or cloud and taking his sun bath on the side of a permanent glacier, where the results of such a sun bath were found to be marvelous. This form of treatment was perfected by Rollier, of Leysin, Switzerland, where, in 1903, he established sanatoria at an altitude of four thousand feet. Here patients were exposed nude to the sun's rays. The length of exposure was carefully regulated by its effect upon the individual. However, only a comparatively small number of people can go to a glacial resort; so man has tried to perfect an apparatus to take the place of the glacial sun bath, and the nearest approach to it today is a mercury-quartz lamp.

Finsen, in 1891, was the first (though Widmarck used rock crystal in 1889) to demonstrate in a scientific manner the value of the actinic rays, but his method of producing them was too expensive to make their use popular; so it has remained for the present generation to perfect an apparatus which would produce them at a nominal expense, thus popularizing them.

Finsen is authority for the statement that the blood in the capillaries absorbs most of these rays; hence their inability to penetrate deeply is not a handicap, for if we can influence the blood stream we can influence any and every tissue in the body.

Jansen has demonstrated that the actinic rays may kill bacteria at a depth of two inches in soft tissue. Our own experiments (see Plate I, immediately following) prove that the rays from the quartz lamp will penetrate a living body weighing one hundred and sixty pounds, and from the even distribution of the light rays upon the exposed plate it is evident that they penetrate bone as well as soft tissue.

Remember that actinic rays are constructive, differing therein from X-rays or radium gamma rays, which are destructive of normal as well as of diseased tissue. Remember also that actinic rays are positive; therefore they will discharge a negatively electrified body. This was first reported by Hallwachs (1888) when he noticed that a negatively charged, insulated metal, such as a gold-leaf electrometer, loses its charge when illuminated with ultra-violet light. He states: "This appears to be a case analagous to those in which light energy is stored, since the light energy is changed into the kinetic energy of moving electrons shot from the metal."

Next to fluorspar, quartz allows more actinic rays to pass than any other known substance. These rays are very short, not over 4040 A., and running down to less than 1860 A. Below this, fluorspar and a vacuum must be used. The region which lies between the ultra-violet and Roentgen and possessing qualities of both is the, at present, unexplored region, though Schumann carried his experiments down to 1000 A. by the use of fluorspar. Very recently the spectrum has been pushed to 905 A.

Arthur Schuster, Professor of Physics in the University of Manchester (1888-1907), says regarding actinic rays: "Below 1800 average (actual 1450 to 2000 A.) quartz and even atmospheric air become strongly absorbent and the expensive fluorspar becomes the only medium that can be used. Hydrogen still remains transparent. The beautiful researches of V. Schumann have shown, however, that, with the help of spectroscopes void of air and specially prepared photographic plates, spectra can be registered as far down as 1200 A. (Later Schumann carried them

Showing
Depth of Penetration
of
Actinic Rays

Nos. 1 and 2 show penetration of a ten-minute exposure with an air-cooled lamp through a body weighing 110 pounds.

No. 3 shows penetration of a ten-minute exposure with an air-cooled lamp through the abdomen of a man weighing 160 pounds.

No. 4 shows penetration of a half-minute exposure with a water-cooled lamp through a hand.

No. 1 (Chest)

No. 2 (Abdomen)

No. 3 (Abdomen)

No. 4 (Hand)

Plate I

down to 1000 A.) Lyman more recently has been able to obtain photographs as far down as 1030 A., with the help of a concave grating placed in vacuo. Although the vibrations in the infra-red have a considerably greater intensity, they are more difficult to register than those in the ultra-violet."

He also states: "It has been denied by some that pure thermal motion can ever give rise to line spectra, but that either chemical action or impact of electrons is necessary to excite the regular oscillations which give rise to line spectra. There is no doubt that the impact of electrons is likely to be effective in this respect; however, it must be remembered that all bodies raised to sufficient temperature are found to eject electrons, so that the presence of the free electrons is itself a consequence of temperature. The view that visible radiation must be excited by the impact of such an electron is, therefore, quite consistent with the view that there is no essential difference between the excitement due to chemical or electrical action and that resulting from sufficient increase of temperature."

From the foregoing statement it is easy to assume that these short rays—from 2000 to 1000 A. and shorter—are the ones possessing real bactericidal value, and that whether the actinic rays absorbed by the blood stream excite chemical, electrical, or thermal action, it is probable that electrons are developed which, when coming in contact with substances within the blood stream, produce constructive rays which are as yet unidentified, and that these rays doubtless lie between the ultra-violet and Roentgen band. These unidentified rays are of greater penetrability than the actinic. In this region may be found the great health-giving, constructive rays which can be used without the dangers of using the destructive gamma rays, whether from X-rays or radium. The comparative penetrability of alpha, beta, and gamma rays are respectively one, one hundred, and one thousand.

Gamma rays travel in straight lines only and are, therefore, destructive. They are of great penetrative power and cannot be deflected, whereas the longer actinic rays are readily reflected, refracted, polarized, absorbed, or deflected and are, therefore, not destructive. In other words, the shorter the wave length the greater the penetration. The actinic rays are invisible to the naked eye. They are known as the cold rays, for quartz filters out the infra-red, red, orange, and most of the yellow rays, which are the heat-producing rays, also some of the green and blue rays. For the production of the heat rays we use a 2000-candlepower lamp, which does not give off actinic or chemical rays. The actinic rays which produce erythema solare, or sunburn, are also the ones which destroy bacteria, and it matters not whether they come from the sun or are produced artificially.

While the quartz lamp supplies the actinic rays in quantity, it gives off but few of the longer rays which produce the visible spectrum, as these are over 4047 A. These lamps undoubtedly supply the ultra-ultra-violet ray,which is known as the Schumann band of the spectrum, though probably in a limited quantity; but who shall say that they are not sufficient in number to produce a therapeutic effect? It is well known in the scientific world today, and the lay public are fast learning the truth, that the vitamins so minute as to be undemonstrable are absolutely essential to good health or even to life itself, as has recently been so well illustrated by the anchoring of the *Krownprinz Wilhelm* in the James River, off Newport News, because of the illness of one hundred ten out of a crew of five hundred who had been two hundred fifty-five days without this life-giving substance.* At the time of anchoring, it was apparent that the remainder of the crew would be disabled in less than two weeks. These men had all the gross food products that man thinks he needs, but their illness proved that that infinitesimal something we call vitamin is essential to health. So it is with the, at present, undemonstrable rays in the region of the Schumann band and beyond. Who can say but that from this region come minute but powerful restorative rays which the future will unfold?

The rays coming from a quartz lamp are strictly of the higher frequencies, as only a few of those above 4040 A. (the violet

---

*For the above fact see Alfred McCann's articles in *Physical Culture* for June and July, 1918.

visible band) are developed. These higher frequencies are destructive of all forms of bacterial life (and this has been scientifically proved), both by direct rays and indirectly by their action upon the blood stream and upon protoplasm.

William Maddock Bayliss, in "Principles of General Physiology," 1915 (Longmans, Green & Co., 4th Avenue and 30th Street, New York City), makes the following statement:

"The greater number of the constituents of living cells are colorless; that is, they do not absorb rays of the wave length of visible light. [They do absorb the actinic rays.—Author.] Many of the structures of living cells, however, absorb ultra-violet light, so that it is not surprising to find that, as a rule, radiations of this kind *have a very powerful effect on them.*

"The use of the absorbing power for ultra-violet of some constituents of living cells for the purpose of photographing them has been referred to, as also the use of the fluorescence excited in them by ultra-violet light absorbed.

"A series of important researches on ultra-violet light is at present being carried on by Victor Henri with several coadjutors, the results of some of which have been published. (See Mme. V. Henri, Victor Henri, J. Larguier des Bancels, and R. Wurmsor, 1912.)

"The absorption of egg- and serum-albumen was next studied. In the former the absorption is feeble for rays longer than 300 $\mu\mu$, increasing to a maximum absorption band at 280 $\mu\mu$, has a minimum again at 250 $\mu\mu$, and then rises again; so that, for the extreme ultra-violet, the extinction coefficient exceeds 1000. At 220 $\mu\mu$ the absorption coefficient of albumin is over 1000; *so it is not surprising that protoplasm is very sensitive to the extreme ultra-violet.*"

Mme. Henri makes the statement that the destructive effect of actinic rays upon bacteria increases in inverse ratio to the length of the waves down to 2140 A., as far as she had tested, and from experience there seems to be no doubt but that this destructive effect increases down to 1000 A. (the ultra-ultra-violet band of Schumann) and beyond. This destructive effect applies not only to bacteria and diseased tissues, but when we reach the region of the Roentgen and radium gamma rays these short rays are destructive of normal tissue as well.

When the region from 1860 A. to 1000 A. and beyond is studied, doubtless there will be many startling surprises and also many problems solved.

Bayliss further states: "A remarkable fact is that the excitability to ultra-violet is independent of *temperature*, a fact which shows that the exciting cause of the reflex movement is a photochemical reaction whose products, no doubt, excite receptors of some kind in the outer surface of the animal."

Nature, April 16, 1908, page 570, makes the statement that the animal body has organs which are stimulated by the radiating energy of light and heat; others are stimulated by chemical particles drifting from odorous objects; others by objects mechanically touching the skin, and that these organs so especially adapted to environmental stimuli are called receptors. Attached to these receptors are nerves which transmit to brain centers the impressions thus obtained.

Rep. Brit. Assn. *Advancement of Science*, 1902, page 778, says: "A receptor being a molecular complex of a cell through the union with which alien cell products or cell constituents can produce their specific effects upon the cell, it stands to reason that in a photochemical reaction, the products of which excite these receptors, we have at hand a method of producing immunity of unsolved possibility."

Ehrlich's hypothesis to explain the action of a receptor is usually spoken of as the side-chain theory of immunity. He considers that the toxins are capable of uniting with the protoplasm of living cells by possessing groups of atoms like those by which nutritive proteids are united to cells during normal assimilation. He terms these *haptophor groups*, and groups to which these are attached in the cells he calls *receptor groups*. The introduction of a toxin stimulates an excessive production of receptors, which are finally thrown out into the circulation and constitute the antitoxins.

Bayliss says:

"Fatigue can be produced with ultra-violet light in Cyclops by very short durations of radiation or by cocaine, but not if the anesthesia is of central origin; by ether, for example. In this latter case the peripheral organs are left intact. These facts show that the reaction studied is really due to photochemical changes at the periphery.

"Since the *absorbing power of protoplasm is very great, especially for the shorter wave lengths of ultra-violet,* the effect can penetrate for only a short distance. In such small organisms as bacteria, however, it may affect the whole organism, so that the action, which is a lethal one in such cases, obeys the laws of photochemical reactions. *In larger organisms we have to take account of diffusion of the products of photochemical change, and their action at places remote from that where they are formed. The laws are, therefore, more complex, and the effects last longer than the actual exposure.*

"While bacteria were killed in from fifteen to sixty-five seconds, Mme. V. Henri and Victor Henri (1912, pages 29-31) find that there is no particular wave length which is specially lethal, but that the effect increases more and more the shorter the wave length, as far as tested, that is, up to 214 $\mu\mu$. Protozoa are killed in about the same length of time as bacteria, according to Hertel. The body swells, water-drops appear upon the surface, and finally disintegration occurs. . . . . Diphtheria toxin was destroyed in five minutes, but antitoxin was not destroyed in thirty minutes. Various enzymes were also rendered inactive.

"Hertel regards the effect as due to *reduction* processes, for three reasons:

1. The effect is less in the green hydra than in the colorless one, presumably due to the oxygen afforded by chlorophyll.
2. Oxyhemoglobin is reduced.
3. If alizarin blue is injected into the veins of a rabbit, the brain is blue, but, if acted on by ultra-violet light, the dye is reduced to its colorless derivative.

"An interesting point is that, if rays of equal energy (as measured by the thermopile) are taken—one of 440 $\mu\mu$, the other of 280 $\mu\mu$—Hertel found that rotifers are killed by the short waves in fifteen seconds, by the long waves only after four or five hours. This fact shows strikingly that *it is not a question merely of energy but of actual wave length, no doubt because the short waves are absorbed by the protoplasm.*

"We have seen how large a number of photochemical reactions are brought about by ultra-violet light, so that we may expect to find it active also on protoplasmic systems. But the nature of these reactions in the latter case is still unexplained. However, protoplasm under the ordinary microscope with ordinary illumination is structureless, but under the ultra-microscope presents the characteristics of a colloidal system, and by this method it has been demonstrated that protoplasm forms organs for particular purposes which appear and disappear according to need. Protoplasm itself is a complex of substances of various chemical natures and in various states of aggregation, associated together by forces of surface tension, electrical charge, etc. The liquid state enables an elaborate play of forces to take place, and chemical reactions can evidently proceed simultaneously in different parts of a cell. Apparently the shorter the wave lengths the greater their absorption by protoplasm up to the point of its destruction.

"Although ultra-violet light has so much more action on protoplasm than visible light, it has been found by several observers that light which has no action by itself on infusoria, bacteria, or blood produces the effect of ultra-violet light when certain dyestuffs are present (eosin, for example). Radiant-light energy is directly converted into chemical energy by photochemical reactions which do not obey the law of mass action.

"Grotthus' law (1819) states: 'Light cannot act unless it is absorbed.' "

One of the great difficulties in the therapeutic application of ultra-violet rays to stop the growth of malignant cells is the very rapid absorption by the superficial cells, so that the active rays do not penetrate more than a short distance. When those which do penetrate the deeper structures are absorbed by the hemoglobin, which is so active and absorbent of ultra-violet rays, the entire body is affected. (See especially the data of Victor Henri, etc., 1912, pages 12-21, 29-31.) Finsen (1901, page 70) used a method of compressing the blood out of the area of tissue to be acted on by the ultra-violet light.

Bayliss further states: "It is, no doubt, due to the products of some photochemical reaction acting on the arterioles, and it would be interesting to know whether, like the effect of oil of mustard, it is an axon reflex in sensory nerve fibers. Chlorophyll contains magnesium and nitrogen but no iron or phosphorus, differing herein from hemoglobin, and is the ester of a complex acid consisting of pyrrol derivatives linked to magnesia. Chlorophyll loses its magnesia more easily than hemoglobin does its iron."

It is well known that these rays are readily absorbed, and the blood passing through the capillaries doubtless absorbs most of them. (See Finsen's statement, page 15.) Just how this latter is brought about we cannot say, but that deep-seated infections which cannot be reached directly by these rays are benefited by them, possibly through the development of other as yet unknown rays, is a fact which cannot be disputed; but their exact action upon living tissues has not been demonstrated. The probability is that they act upon the lymph channels, endothelial cells, erythrocytes, leucocytes, hemoglobin, and the blood stream generally, and upon glandular tissue, increasing their phagocytic power in much the same manner as sunlight improves the vitality and the immunizing power of the body. In short, they aid the development of the antibodies and are, therefore, antigenic. Thus are the bacteria within the body destroyed by these rays.

Remember that antigens stimulate the production of antibodies. They may be infectious or harmless bacteria, animal cells, toxic substances, or innocuous proteins. Actinic rays may break down proteid matter, producing toxins or enzymes of unknown chemical composition. Antibodies have never been isolated and their chemical nature is unknown, but they accompany or are a part of the serum proteins. Their characteristics are the same. They are unstable compounds easily destroyed by heat or chemicals. Proteins are complex, nitrogenous bodies which play a great part in the chemical reactions and the metabolism of the cell, and according to Houghton and Davis interfere with the action of actinic rays.

Science, volume 46, page 318, F. I. Harris and H. S. Hoyt, University of California, says: "It is the general law of photochemical action that only those rays are effective which are absorbed by the system in which the reaction occurs. Visible light rays are not, as a general rule, selectively absorbed by protoplasm; hence their action is superficial."

The above is Grotthus' law, which is as follows: "Light cannot act unless it is absorbed."

Harris and Hoyt also state the following: "Ultra-violet light is generally highly toxic, even for colorless organisms, and, since this toxicity presumably depends upon and is attributable to photochemical reactions, the question presents itself: To which constituent of the protoplasm are we to attribute the selective absorption of these rays, which is the necessary precedent of their photochemical activity? We may infer that solutions of gelatin, peptone, aminobenzoic acid, cystin, tyrosin, and leucin detoxicate ultra-violet rays which pass through them. Many others do not. We may infer that ultra-violet light induces chemical changes in a leucin solution resulting in the production of substances having an enhanced power of absorbing ultra-violet rays. Our results are, therefore, decidedly in harmony with the view that the susceptibility of protoplasm to ultra-violet light is conditioned by the aromatic amino-acid radicals of the proteins."

"Spectrographic Study of Amino-acids and Polypeptides," by Philip Adolph Kober, August 15, 1915, Roosevelt Hospital, New York City, says: "The results of this investigation show that with the exception of the aromatic derivatives, phenylalanine and tyrosine and amino-acids, where they are marked, do not show any special absorption being general in the extreme ultra-violet. The same holds true with their alkaline and acid salts. The absorption of aliphatic amino-acids in acid or alkaline solution is only general in the extreme ultra-violet region."

In conjunction with the action of the actinic rays upon the blood stream must be studied their action upon the cuticle, which is exfoliated, thus increasing elimination of toxins from the body, both temporarily and permanently. The exfoliation of the cuticle improves the local nutrition and frees the obstructed glands. This is clinically certain, even though we cannot explain to you in a scientific manner just how these rays penetrate the surface of the body to gain entrance to the blood stream, *but that they do we do not doubt; and if you will use these rays in treating your cases suffering from acute infection or with chronic constitutional disorders, and will use them conscientiously and persistently, giving sufficient time for the rays to act and of sufficient frequency to get a continued effect, we are morally certain that you will agree with us that they are the best single method of treatment you possess.* It is taken for granted that you will not try to supplant all other forms of treatment with actinic rays.

Remember once and for all time that these rays are not a panacea for all of the ills of human flesh, but that they are ONE of the best methods of treating these ills.

As these rays are chemical, they produce chemical changes within the blood stream and body, increasing their physiological activity. The only time we have known of their producing any pathological activity was when a patient went to sleep under the air-cooled lamp and remained there for one hour. After this experience she was dull, stupid, and inactive and suffered from amnesia and loss of will-power for several days. It must be

CHAPTER II

THERAPEUTICS OF ACTINIC RAYS

THE therapeutic uses of actinic rays are as follows: ***Constructively***, they are antigenic, increasing the immunizing powers of the body; they increase the erythrocytes and normalize the leucocyte count; they allay inflammatory conditions by destroying bacteria (spirochetes seemingly are an exception to this rule); and in neurasthenic conditions they vitalize and soothe. *Destructively*, they are used to destroy infections (except syphilis), some foreign growths, and the epidermis.

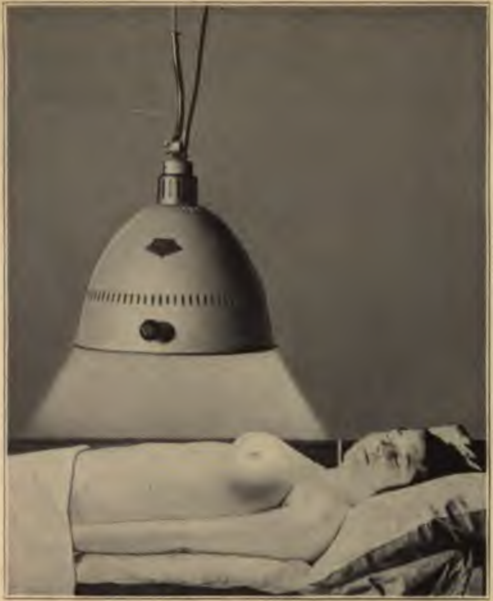
These rays positively will not destroy the normal tissue within a reasonable length of time (*say forty-five minutes with a direct-current lamp*), although they do produce a severe, benign inflammation after fifteen or more minutes—but this reaction is many times exactly what we wish to produce; yet, in the most severe cases, it subsides in three or four days.

The early use of these rays from an artificial source, the Finsen lamp, was limited to the surface of the body, but at the present time we know that all tissues are affected by them (either directly or indirectly), and, therefore, constitutional disorders may be benefited by their use.

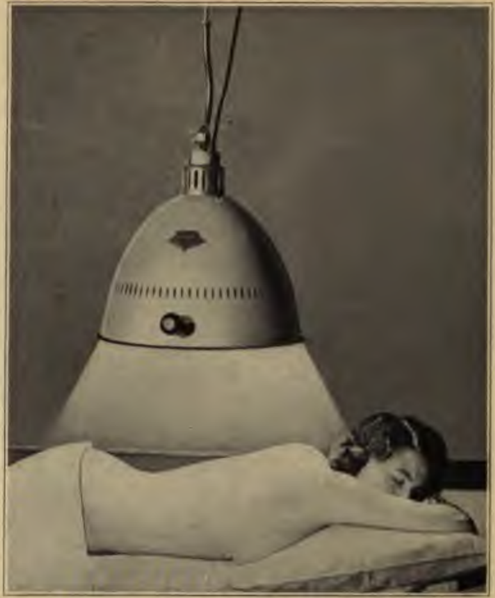
It is taken for granted that one will not neglect surgical principles, dietetics, sanitation, hydrotherapy, heliotherapy, kinesotherapy, electrotherapy, thermotherapy, vibration or even drugtherapy, which are today in the civilized world scientific common sense.

These rays both energize and soothe. Their soothing effects are shown by the fact that patients will often go to sleep while taking their treatment and awaken refreshed, their energizing effects by the sense of well-being after each treatment, and especially so after several treatments.

Illustrations
Showing
General Treatment
with
Radiant Light
and
Actinic Rays

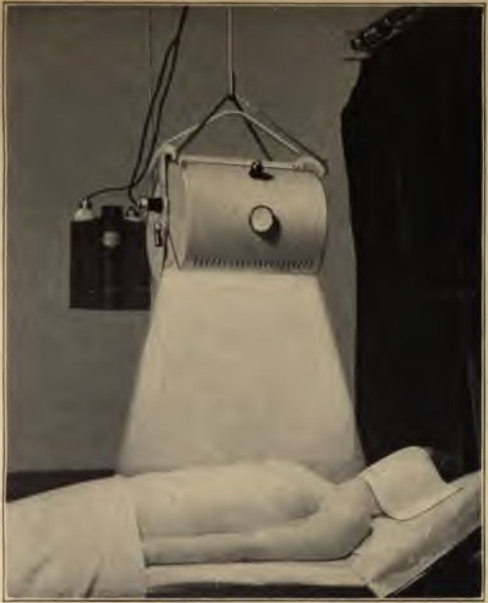


First position of patient for general treatment with radiant light. Note position.

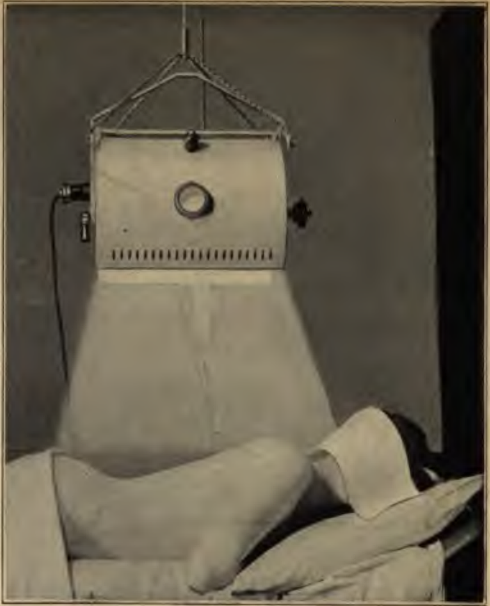


Second position of patient for general treatment with radiant light. Note distance.

Plate II



Third position. Patient receiving first part of general treatment with actinic rays.



Fourth position. Patient receiving second part of general treatment with actinic rays. Note facial covering.

Plate III

In general, our method of giving these treatments in chronic cases is to begin with a one-minute treatment and increase one minute per day until treatments of ten or fifteen minutes are reached; and this applies to each surface of the body treated. We start with the lamp at a distance of about twenty-four inches, gradually decreasing the distance until the lamp is not more than twelve inches from the body. This applies to the air-cooled lamp only and for general treatments. If the air-cooled lamp is used for local treatments, the distance should be about two inches and the time would be about the same as for the water-cooled lamp. For local treatments and for small areas, we use a water-cooled lamp, usually in contact or nearly so. The time of the treatments varies from one to sixty minutes, with an average of about five minutes for the surface of the body, while for mucous membranes two to ten minutes is sufficient.

In giving a general body exposure, the eyes are the only portions that are fully protected, and these only to avoid a benign conjunctivitis, which, while exceedingly painful, is not destructive. For the protection of the eyes during facial treatments, the lids are covered with small pledgets of absorbent cotton, which are held in place by tying a thread over them and around the head. It has been found best in many cases to ray every possible inch of the body. In some instances we ray even the soles of the feet.

The treatment of conjunctivitis by actinic rays is perfectly feasible, as are cases of palpebral infections. W. E. Burge (Archives of Ophthalmology, September, 1915) found by experimentation that the lens of the eye was still transparent after one hundred consecutive hours of exposure to actinic rays from a quartz lamp; thus proving almost conclusively that these rays will not destroy the transparency of the lens within any reasonable length of time.

Exception: Analyses show a decided increase in the amount of salts contained in cataractous lenses, and these have been proved to be calcium chlorid, magnesium chlorid, and sodium silicate, and, as cataracts are found in diabetics, dextrose probably plays a part in their formation. Using these known facts, Burge continued his experiments using these substances in solution and found that the lens protein modified by them *could be* coagulated by actinic radiation and opacity of the lens produced. It appears from the experiments that these same substances decreased the fluorescence of the lens, which suggests the thought that there may be some relation between the fluorescent property of the lens and its ability to resist the actinic radiations.

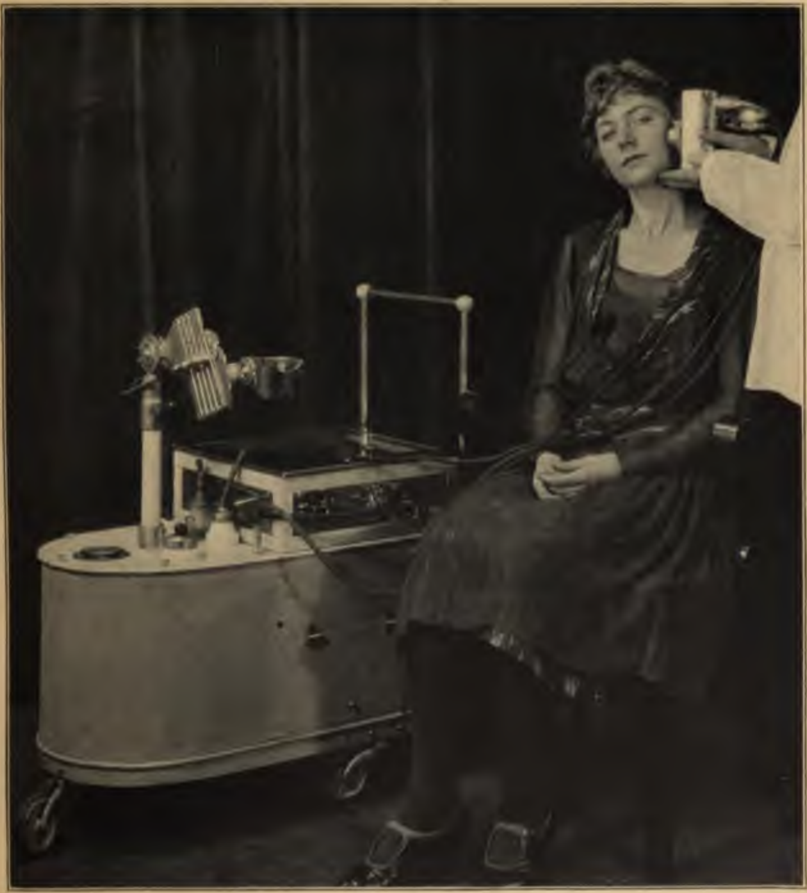
Experiments were then made with actinic rays on non-fluorescing and fluorescing bacteria, and it was found that, of seven different kinds of the first variety, none were alive after an exposure of two hundred seconds, while none of the cultures of the latter form of bacteria were completely destroyed after a similar length of time. Burge advances the provisional hypothesis that the great resistance exhibited by the lens and by fluorescing bacteria to the action of the actinic rays is due to this power of fluorescence, and he assumes that the lens and fluorescing bacteria convert the absorbed short waves into longer waves, thus diminishing more or less the energy which otherwise would have been spent in coagulating their protein.

In treating chronic cases one must not look for immediate results, but rather a gradual improvement from week to week, while in acute cases one may reasonably expect improvement within a few hours. We sometimes get results in minutes.

Experience has taught us that much greater benefit can be obtained if the capillaries are first dilated with a two- or three-thousand-candlepower radiant light, bringing the blood to the surface where it can be acted upon by the actinic rays, lymph and blood stasis being relieved by the same method and at the same time.

DEEP PENETRATION

Recognizing the fact that the blood stream absorbs *most* of the actinic rays, it stands to reason that if deep penetration of tissues with large quantities of rays is desired, all circulating



Local treatment under compression.

Plate IV

blood must as far as possible be eliminated. This is done by what is known as the "compression" method, which is as follows: A quartz crystal lens is pressed firmly against the tissues, thus interfering with the circulation of the blood for the time being; but, as this method prevents the absorption of the rays—thus increasing local action—they must be used with caution and a shorter treatment given; otherwise the blue quartz filters must be used to remove the shorter rays, which, when not absorbed, may be destructive. It must be remembered that the extremely short actinic rays are closely associated with the still shorter X-rays, which are exceedingly destructive of normal as well as of pathological tissues. In other words, in this region (the ultra-ultra violet) of the spectrum we are approaching the danger zone.

Quoting from a recent editorial of the *Journal of the American Medical Association* on "Light, Radiation and Protoplasm," we give you the following: "The newer knowledge in the field of physics has brought about a recognition of the fact that, in addition to the visible electromagnetic waves, the invisible infra-red and ultra-violet light waves also have indisputable chemical and biologic effects. Dr. Bovie has recently reminded us anew that the substances of which living organisms are composed are capable of resonant vibrations over a considerable range of vibration frequency, including the entire range of solar radiation. Protoplasm is capable of detecting and being modified in some degree by the electromagnetic manifestations constituting the radiant energy received from the sun. . . . . The physiologic effects of light must be the result of photochemical reactions. One of the important discoveries made by Finsen was that it is the blood in the skin which absorbs *most* of the ultra-violet light. Ultra-violet rays coming from the sun penetrate blood-filled skin only a fraction of a millimeter, but if the skin is made ischemic (by pressure) bacteria can be killed by ultra-violet light which has passed through 4.25 millimeters of skin."

Regarding the use of the blue filters for screening out the shorter, more intensive rays and the use of compression for getting deep penetration, it has been found after years of constant use of the actinic rays that this is seldom necessary and that results were much better when all the rays coming from the lamp were used. Without the screens, shorter periods of time are necessary to obtain the same or better results. The usual period of treatment without the screens is from five to thirty minutes, with the screens from thirty to ninety minutes, and it has been found that it is next to impossible for a patient to sit still for these long periods of time. It has also been found that, in the majority of cases, short, frequent (daily) treatments were better than long treatments with prolonged periods of time intervening. In most cases it is better to get a slight improvement from each treatment and to get the treatments close enough together to get a continued effect than to try to produce profound impressions with a single treatment. In short, evolution is always to be preferred to revolution.

The early use of these rays was limited to diseased conditions on the surface of the body, but, as has been stated, they are now being used effectively upon all tissues; but in treating the deeper structures, as in chronic constitutional disorders, one must not look for immediate results but rather for a gradual improvement noticeable from week to week. *It is understood that under all circumstances gross amounts of infective materials should, if possible, be removed by surgery before beginning the light treatments.*

Diseases affecting the epidermis are readily relieved and many of them cured in a short time. Eczemas are among the most favorable of conditions for treatment with actinic rays, but it must be remembered that these conditions are but local manifestations of etiological factors which are to be found in the deeper structures. Many, if not most, cases of eczema are due to disturbances of the vegetative functions. If the disordered functions are not corrected, only temporary results can be expected from actinic-ray treatments. *Do not take it for granted that immediate relief of symptoms means a cure of underlying pathology.* What is true of the epidermis is also true of some diseases that affect the derma and subdermal tissues; thus nævi and lupus (either erythematosis or vulgaris) are readily removed. The only destructive effect of these rays is upon the cuticle, which may be removed by them, and with it any deviation from the normal occurring therein, and that without scarring.

The immediate action of actinic rays upon the blood vessels is upon the endothelium, in which there is produced an active hyperemia and a proliferation of these cells (X-rays also produce a proliferation of these cells, but carry the proliferation to the point of occlusion of the blood vessel, producing what is known as X-ray burn). Herein lies one differentiation of X-ray and actinic-ray burns: the former occludes all blood vessels, both surface and deep, causing destruction, while the latter destroys only the surface vessels, and then only the pathologic ones, wherein the endothelial cells are more readily proliferated.

After prolonged radiation of pathological tissue, a benign inflammatory reaction takes place which ends in the destruction of the blood vessel and the obliteration of its lumen, and this is exactly what we wish to produce when treating nævi. As these rays are absorbed by the blood stream, this inflammatory reaction is hastened by using compression with clear quartz crystal lenses. It is not necessary that all the pathology be destroyed at one sitting; in fact, it is better if but a portion is destroyed and this tissue exfoliated before another treatment is given. In this manner the destruction of tissue is under constant control and the end result should be normal tissue. Herein is the advantage of actinic rays over X-rays, radium, carbon-dioxide snow, cautery, or surgery, all of which destroy normal as well as abnormal tissue.

Some time ago we saw a case of lupus vulgaris of about the size of a quarter which was practically cured with one twelve-minute treatment with actinic rays (water-cooled lamp).

A case of tinea barbæ (see report, page 118) of four weeks' standing which covered the entire right side of the face and neck, spreading beyond the median line both anteriorly and posteriorly, was practically sterilized in one treatment of nine minutes with the air-cooled lamp. The scab was removed the next day and never returned. No drugs of any kind were used.

Such cases as X-ray burns, telangiectasis, osteomyelitis, splenomedullary leukemia, and Hodgkin's disease are being treated with these rays, as well as chlorosis, anemia, and nephritis, and with apparent good results. Later reports will show how good (see Chapter IV). We are quoting the foregoing wide range of diseases to show the possibility of the use of these rays.

We have used these rays from the water-cooled lamp (direct current), with the lamp in contact with the skin, for fifty consecutive minutes with the rheostat turned on the fourth button without any destruction of normal tissue below the epidermis. This was in a case of hemangioma (see report). In a case of cystoadenoma of the breast we used them for thirty minutes. This case we felt sure was a case of advanced carcinoma when she came to us in June, 1916, and it had been so diagnosed by three prominent surgeons of Chicago. The breast was one contracted mass, with the nipple drawn in until it was barely visible; the axillary glands were badly involved, one being as large as a small hen's egg; and she was unable to use the arm; yet within ten days, under intense raying, she was able to do her own housework. In June, 1918, she was in the best health she had had in fifteen years; hence our diagnosis of cystoadenoma, for we cannot believe that a carcinoma in the same stage would have yielded to the same treatment in the same length of time. No microscopic analysis was made (see report).

Another case to show why we are certain that these rays produce constitutional effects: Case No. 214. Male. This patient came to us March 25, 1917, with a history of periodical attacks of pain in the upper abdomen, lasting for a week or two, covering a period of some nine years. This attack had lasted since January 1, 1917. Pain started about one and one-half hours after eating and was so severe that it required five to seven quarts of milk a day and one quart at night to allow him to work and sleep. This was his method of stopping the pain when he came to us. After one treatment of five minutes he slept over fourteen hours without awakening; no medicine was used. After two treatments with the air-cooled lamp, of five and six minutes, respectively, he was able to go a half-day without the milk and without pain. After eight treatments, the longest one of seven minutes' duration, he was eating regular meals and sleeping all night, *without pain.* He had fourteen treatments in all between March 25 and May 7, 1917, when he felt so well that he stopped treatment without permission. October 5, 1917, he returned, saying that he had been having pain again for the past two weeks.

We had been having considerable discussion with various physicians about the advisability of using the 2000-candlepower lamp in conjunction with the actinic rays. They had usually insisted that the results would be as good without the actinic raying, and that these results were due to the heat rays given off by the 2000-candlepower lamp and not to the actinic rays. It occurred to us that this would be a good opportunity to try this lamp alone; so five twenty-minute treatments with the 2000-candlepower lamp were given without using the actinic rays. The only relief obtained was for a couple of hours after each treatment. A four-minute actinic-ray treatment was then given, which was followed by about twelve hours of relief. The next treatment was of five minutes' duration, and the next of six, after which there was very little if any pain. The fourth treatment was eight minutes in duration, as were the following ones, with relief of all pain. Nuxvomica and bismuth subnitrate 2x were the only remedies. Nothing was said to the patient about the experiment; so it was not suggestion that relieved him when we again started using the actinic rays. Our diagnosis was gastric ulcer (see report, page 84).

In gynecology splendid success is being obtained, and such cases as Neisserian infections, pelvic inflammations, endometritis, cervical erosions, vaginitis, endocervicitis, pruritis vulvæ, dysmenorrhea, and metrorrhagia are being treated. These treatments are usually given with the water-cooled lamp, though they may be given with the air-cooled. The first treatments given are of five minutes' duration, the subsequent ones running up to ten, and they are usually given through a vaginal speculum.

Again remember that these rays are used as an auxiliary to recognized methods of treatment.

In surgery the actinic rays are of immense value as a follow-up treatment, using them for both local and general effect. General radiation is used to improve the vitality of the individual and to restore the vegetative functions to normal. Locally they are used to destroy infections, to heal fistulous tracts, and to stimulate granulations.

The following case illustrates the increase of granulation tissue occurring in an open sore when the rays are properly used: A fistula due to tubercular adenitis of six months' standing *was closed inside of three days following a single two-minute treatment with the water-cooled lamp.* In another case of numerous sinuses following operation for tubercular adenitis all the sinuses were closed in six days after five daily treatments. The edema of lymphangitis has been known to disappear inside of twenty-four hours after three treatments a few hours apart. The general improvement of the patient is marked, many times after the first and almost invariably after five or more treatments.

Capillary oozing from fresh wounds is readily controlled by the action of actinic rays, and not only are the superficial blood vessels occluded but the lymph vessels as well. What applies to one applies to both. This action, no doubt, explains the rapid relief of symptoms in cases of lymphatic infection.

A. Rollier is authority for the statement that the actinic rays activate oxygen, and it is well known to all users of the quartz lamp that ozone is produced in quantity upon lighting the lamp and to a less extent after it is properly heated. The exact amount of benefit the patient under treatment receives from the ozone so generated is not known, but undoubtedly it has a certain amount of health-giving properties, even though we cannot measure it exactly, for it is a well-known scientific fact that oxygen is essential to health and that diseased tissues are frequently deficient in oxygen. It is also a well-known scientific fact that the skin absorbs oxygen in large quantities, and this absorption is more rapid when taking these treatments on account of the body being nude. And it is well known that when the skin is covered by an impermeable dressing, thus excluding oxygen, the individual soon dies; therefore it is easily understood that any additional oxygen — whether internally or externally — which may be given to a person suffering from a deficiency of oxygen will aid materially in restoring that individual to health. Metabolic changes, both local and general, are rapidly increased following treatments with actinic rays.

Many times a single treatment of but a few minutes' duration will produce results which are a marvel to the individual receiving the treatment and to the person administering it. As an instance of the above-mentioned relief, we have seen the pain of a gastric ulcer which had been almost continuous for months completely relieved in a five-minute treatment. So complete was this relief that the patient, who had been unable to sleep for more than an hour at a time for months previous to the treatment, was able to sleep fourteen consecutive hours following this single treatment. No drugs used.

Metabolic changes in localized surface areas are also very rapid, and we say this advisedly, for we have seen the pain of a streptococcic infection of some hours' duration, which was extending rapidly, completely relieved after a two-minute treatment. It is not possible to ascribe this relief to increased phagocytic action alone in this length of time; hence it must be due to destruction of the bacteria within the area, which would stop the production of the toxins and the rapid absorption of the chemical or toxic irritants which caused the pain. The normal elimination of toxins is very rapid once their production is stopped, but the rapidity of elimination is increased by the action of the actinic rays in all cases where the functions of the eliminative organs are not too badly interfered with or the organ itself destroyed. This action may take place at some distance from the area treated, and it can only be ascribed to the changed condition of the blood stream by the absorption of the actinic rays or the development of other unknown rays produced by the action of these chemical rays upon the constituents of the blood stream.

As we have before stated, actinic rays are not destructive of normal tissues or functions, but are truly anabolic in their action, raising the resistance of the tissues, both local and general. In other words, they aid Nature in her fight against disease. One can use these rays to produce the simplest hyperemia or to produce an active hyperemia extending into the tissues for an inch or more; and it is intensely interesting to watch the benign inflammatory reaction so produced destroy the pathological inflammation due to an infection. Again your attention is called to the fact that the reaction produced by these rays is truly benign and is never destructive of normal tissue below the epidermis.

Just a word of caution should be added to the above statement, to the effect that granulating tissue may be destroyed by these rays before it becomes fully organized; hence a shorter treatment and a greater distance from the lamp are necessary. As a general statement, not more than one-tenth of a full treatment should be used under above conditions.

The effect on metabolism is well shown in the action of these rays upon patients suffering from nephritis. In many of these cases the inflammation of the kidney subsides and casts and albumin disappear from the urine, and with this improvement comes a corresponding lowering of the blood pressure. In these cases we do not doubt but that much of the improvement in the individual's general condition comes from the improvement in the tissues of the body as a whole, for the elimination is decidedly increased (urea and creatinin elimination is especially increased) and all normal processes activated. The results of the general raying of the entire nude body are an increase in the percentage of hemoglobin and the number of erythrocytes, while if the white blood corpuscles are increased in number this treatment will reduce them.

The uses to which the actinic rays may be put in the treatment of diseased conditions are not known. We are but starting on this journey and the way appears dark, but each new success brings with it new light. There are many surprises in store for those who are using the rays constantly, and we can say this to the physician who is but beginning their use: *You will on more than one occasion doubt your own diagnosis, or else you will change your prognosis.*

After purchasing a lamp, use it on yourself before trying it on a patient. The results will be of advantage to you and to your future cases. It will give you some real knowledge of what these rays will accomplish locally and teach you that you are dealing with a very potent agent. While the blisters which they produce are very uncomfortable, they are many times very necessary, and after a patient has experienced decided relief from them he will frequently ask to be blistered. But to blister a patient with the first treatment will many times frighten him into discontinuing the treatments, especially if he has not been informed in advance of this possible action. In using the water-cooled lamp this caution is needed more than with the air-cooled, and with the alternating-current air-cooled lamp more than with the direct-current air-cooled lamp. When the quartz lenses are used on the water-cooled lamp the action is still more intense. A half-minute with the water-cooled lamp in contact will in many cases produce a sunburn that will be apparent for a week; notwithstanding this, we frequently treat the same area daily, and, as has been noted elsewhere, we have extended the period of a single treatment to fifty minutes (*in later cases to sixty*).

HYPERTROPHIED TISSUES

We are using the actinic rays for hypertrophied tonsils and turbinates. The congested turbinates of the hay fever case are readily contracted without the reactive dilatation of adrenalin, bringing relief in a half-hour's time.

We are also using these rays for prostatitis and vesiculitis, using our special applicator for these cases.

Tuberculosis in all forms seems amenable to these rays, even to the improvement of joint functions.

Try actinic rays on your neurasthenics if you want a real surprise.

CONCLUSIONS

1. *Infected wounds of all kinds yield readily.*

2. *Actinic rays produce local effects when so desired.*

3. *Actinic rays produce systemic effects, even at a distance from the area rayed.*

4. *Actinic rays energize.*

5. *Actinic rays soothe.*

6. *Actinic rays produce a benign inflammation which is not destructive, because they destroy existing infections.*

7. *General actinic-ray treatments should be of one minute only for the first treatment, increasing one minute per day until ten-minute treatments are reached.*

8. *Actinic rays will not destroy normal tissues within a half-hour's raying.*

9. *Local actinic-ray treatments may be given for ten minutes in contact if necessary. After many treatments are given, the time may be increased to sixty minutes if necessary.*

10. *Actinic-ray treatments should be given daily until improvement is noted and then less frequently.*

11. *A preceding radiant-light treatment is essential to success.*

CHAPTER III

RADIANT LIGHT

WHILE this book is intended as a treatise on actinic rays, it would not do them justice to leave out this chapter on radiant light, which is so necessary a factor in treating diseased conditions with these rays.

Sunlight always has been and always will be a necessary factor in maintaining or regaining health, but it is not always convenient to take sun baths, while radiant-light baths can be given in any room equipped with an electric current.

It is now well known that light of all kinds is destructive of all forms of bacterial life. It is Nature's universal bactericide. When using radiant light, we are using nearly all of the sun's rays except infra-red and ultra-violet, both of which refer to their position in the spectrum and not to color. So far as is now known, the infra-red rays have no special value as a therapeutic agent. On the other hand, the actinic rays are among the most valuable. The color of the ray depends upon the rate of vibration and the length of the wave which strikes the retina. The longer the wave the less its penetrative power, while the shorter the wave the greater its penetration.

Radiant light is the best single method we have of relieving pain, and this relief is often possible even in pus cases, although one would be guilty of neglect to treat a pus case long without drainage. Drain your pus case and then use phototherapy to hasten healing by removing blood stasis and flooding the area with good, freshly oxygenated blood. That oxygenation of the blood stream is hastened by light has been scientifically proved (Quinke).

Radiant light greatly increases metabolism, acting as an alterant and reconstructant, raising the temperature of the body and reducing the blood pressure. Physiological processes in the human body are greatly retarded or entirely destroyed by the absence of light; on the other hand, they are destroyed by too much light. Both of these facts are to be remembered when giving phototherapeutic treatments. These are real facts, known to every intelligent, observing human being; yet they are usually so far forgotten that they are but infrequently made use of in treating diseased conditions.

Again let us repeat that radiant light and actinic rays (actinic rays are invisible to the naked eye) are obtained from different sources and have different actions. Remember that, no difference what the source of light, if there intervenes a film of glass between it and the object being rayed, actinic rays in any appreciable quantity will not be delivered, for they cannot pass through glass of any thickness. The portion of the body being treated must be absolutely nude.

Colored screens are at times used when giving radiant-light treatments and have a limited value. Red rays are the most irritating, while blue are the most soothing. Yellow and green rays are the most stimulating to plant or body growth. They lack the irritating qualities of the red and the soothing qualities of the blue. Gray is neutral. The effect of colors upon disease has not been sufficiently studied, but if one wishes to take a glimpse into this field, read "Light and Color," by Colville. So far as our experience goes, just as good results are obtained without colors. A possible exception to the above rule might be made with regard to blue, which does seem to relieve pain more quickly than the clear glass. We shall report on this in the future after more experience.

Radiant light has a decided tonic effect, creating a sense of well-being and stimulating nutrition through its action on the sympathetic nervous system. An inactive skin is made intensely active by radiant light, and this eliminative action should be increased by the copious drinking of hot water (ten or more glasses per day) and sufficient outdoor exercise, the latter to be suitably regulated to the need and ability of each individual patient.

Acidosis is decreased due to the rapid increase of the alkaline properties of the blood stream.

Sciatica and neuritis are greatly relieved and the case prepared for actinic-ray treatment by the use of radiant light. This is also true of anemia, nephritis, and most chronic inflammatory conditions.

Bronchitis and pulmonary congestions are readily relieved by radiant light. Keep your bronchitic case under the light for from thirty to sixty minutes and repeat daily or even twice daily in severe cases.

Dysmenorrhea sufferers are most grateful for a treatment with radiant light, as it relieves the pain, and they will frequently go to sleep in less than half an hour.

Pleurisy, either dry or with effusion, is rapidly amenable to these rays. In fact, the more acute the disorder the more we are given to using the radiant light and the less we use the actinic rays, unless the case be violently infective. We feel certain that every case of chronic constitutional disorder which is being treated with actinic rays should first be treated with radiant light, for reasons stated below.

We have tried everything from 100- to 1500-watt bulbs, but have finally settled on the 1500-watt nitrogen bulb as the best, although the 1000-watt nitrogen bulb answers every purpose and even the 50-watt bulb is useful where a portable lamp must be used. Our preference of reflectors is Burdick's or Roemer's Perfect, as they give a greater number of parallel rays and less of a focal spot than any others within our knowledge.

Finsen first demonstrated, and many other workers in this field have since proved his statements correct, that most of the actinic rays are absorbed by the blood stream. While we know this to be true, we also know that some of them will penetrate several inches of tissue. But granting the known fact that most of them are absorbed, how are we to get the blood stream where it can be acted upon by actinic rays to the best advantage? Our method which we have quoted throughout this book is to precede the actinic-ray treatment with a radiant-light treatment of from ten to forty-five minutes; average, twenty minutes. This dilates the surface capillaries and brings large quantities of blood to a point where it can be reached with the least difficulty by the actinic rays; meanwhile blood, both arterial and venous, and lymph stasis are being relieved and their products removed by the action of the radiant light. This gives the actinic rays a better opportunity to destroy infections within the tissues, for the bacteria are more readily reached, and the more directly the actinic rays can come into contact with the bacteria the greater their bactericidal power.

Sunlight and radiant light (to a less degree) are destructive of infections, but both to a less degree than actinic rays artificially produced. On the other hand, the radiant rays are much more soothing than the actinic rays, while the combination makes an almost ideal treatment for most infections or painful disorders. We would not even venture the suggestion that a pus appendix, gallstone colic, or nephrolith should be treated by either actinic rays or radiant light, and yet we have seen many a classic appendicitis or cholecystitis clear up under their use and a pyonephrosis without nephrolith that had resisted months of treatment by drugs, both internal and injected into the pelvis of the kidney through the ureter, improve almost from the first treatment with the combined use of actinic rays and radiant light.

While conscious of the above facts, we are, however, going *to keep on repeating the fact that actinic rays and radiant light are not cure-alls and cannot be used by every layman to treat every named disease with the hope of curing it, but that they must be used with intelligence and with more than just common sense.* They must be used by those having an intimate knowledge of physiology and pathology, that they may know their limitations; and we wish to add, on the other hand, that the knowledge of their limitations must come from experience and not from prejudice, so when we say that sprains and bruises can be relieved in one hour's time and the patient returned to his occupation in one-fifth of the time it would take with the orthodox splint treatment, you will not be willing to condemn without a knowledge of the real facts in the case.

When we say that actinic rays preceded by radiant light are the best treatment for osteomyelitis, do not neglect to give us credit for a sufficient knowledge of pathological processes to know that the case should be drained or a sequestrum removed; but *after* drainage or the removal of a sequestrum *what* would you do with the case? Here is where common sense and a knowledge of phototherapy are invaluable, and if used will hasten the healing processes of Nature and your case of osteomyelitis will bless you for this additional knowledge in addition to your surgical skill. We have taken cases of this character and relieved the pain and hastened the healing after the surgeon had operated repeatedly—operated only to tell the patient that he must reoperate or amputate, as there was nothing else to do. There *is* something else to do, and if the practitioner of medicine will not do it, then he has only himself to blame if the layman takes it upon himself, even in his ignorance of pathology, to learn of a better way.

We are not trying to build up a new school of therapy. What we are saying is so old that it is a shame that it need be said at all. It is so self-evident with the least thought that we wonder why the medical profession have been so slow to take up this line of work and why they have had to wait until the non-medical cults have forced them to.

Radiant-light treatments are given with the part being treated exposed directly to the rays and at a sufficient distance from the lamp to avoid discomfort or irritation, or, put in another way, close enough to the lamp to be comfortable. The length of treatment should be fixed by the results obtained. To dilate the capillaries, ten minutes is usually sufficient, after which the actinic-ray treatment is given. When used alone for bronchitis, the treatments should be of sufficient length to relieve the distressed breathing, which usually requires from thirty to sixty minutes; for lumbago, twenty to forty minutes; for sinus infections, thirty to ninety minutes; for pleurisy, thirty to sixty minutes; for dysmenorrhea, thirty to sixty minutes; to activate the skin, forty-five to ninety minutes—and so on through the list of diseases which are alleviated by these rays. The average treatment is about twenty minutes; they range from ten to sixty in all but a few exceptions, when this time may be doubled. In frequency the treatments usually are given once daily or every other day, though in severe cases they may be given twice daily.

CHAPTER IV

CASE REPORTS

THE following cases are taken from our case records. In some instances all treatments are given, but in most cases, owing to the length of time during which the patient was under treatment, the number of treatments was too voluminous to quote verbatim, so only a sufficient number has been given to show the variation in treatments at different periods, so that they may be used as a guide. No two cases are treated exactly alike, even of the same disease, and the treatment of an individual case will vary from day to day, depending upon the progress of the case.

Actinic rays should be used as an auxiliary to recognized methods of treatment and not as a panacea.

ABSCESS

Alveolar

Case No. 136B. Female. Age, 30. Referred by Dr. William E. Boynton, Chicago. Came to us January 3, 1917, suffering with an alveolar abscess. The tooth was extracted and the abscess broken into through the root canal. Two-minute actinic-ray treatments (water-cooled lamp) were given on the 4th, 5th, 8th, 10th, 12th, 15th, 18th, and 20th, when it stopped draining. There was no pain after the second treatment.

This case had been diagnosed as a periosteal tumor and its removal by chiseling recommended.

Peritonsillar

Case No. 145. Female. Age, 43. Came to us suffering with a peritonsillar abscess. Her neck was swollen from angle of jaw to clavicle, from median line anteriorly to median line posteriorly. Temperature, 102; pulse, 120.

We opened the abscess March 11, 1916, at Garfield Park Hospital. The opening was made at junction of upper and middle third of sterno-cleido-mastoid muscle and posterior to it. About four ounces of pus evacuated and a rubber tube was inserted. On March 27 another abscess was opened at junction of middle and lower third of mastoid muscle and anterior to it. About one ounce of pus evacuated and a rubber tube was inserted.

On April 27, 1916, she came to our office with the same side of her face swollen, but the main point of tenderness was immediately below and anterior to the angle of the inferior maxilla. Chills had recurred, showing that pus had accumulated at this point.

Began actinic-ray treatments with the air-cooled lamp. First treatment was ten minutes; the next day gave a six-minute treatment on account of sunburn; the third day a fifteen-minute treatment, at which time the swelling was diminishing and she was without pain. Following this, she had treatments May 1, 3, 5, 6, and 12, 1916, when she was dismissed without having to put in a third drain or even open the abscess. September 1, 1916, she was in normal condition.

ACNE

Vulgaris

Case No. 380. Female. Age, 23. Acne vulgaris for the past three months, located on forehead and chin. First actinic-ray treatment January 2, 1918, when the water-cooled lamp was used at a distance of two inches for three minutes. Second treatment was on the 4th; third treatment on the 12th, when the condition was much improved; and her fourth and last treatment was given on the 19th.

Vulgaris

Case No. 388. Female. Age, 25. Referred by Dr. Mary Hanks, Chicago. Acne vulgaris for three and one-half years, during which time she had used X-rays, high frequency, ointments, and internal remedies.

Her first treatment was on January 17, 1918. It consisted of fifteen minutes of radiant light, with the lamp at a distance of twenty-four inches, and one minute of actinic rays with the water-cooled lamp at a distance of two inches. Other treatments were given on the 19th, 22d, and 29th, after which improvement was steady. February treatments were on the 5th, 9th, 19th, and 27th, and were of one and two minutes' duration, at a distance of two inches, as the patient blistered easily. March treatments were on the 4th, 13th and 21st, and April treatments on the 10th and 18th. All treatments were two minutes or under in time, at distances of from one to three inches, and all were preceded by radiant light, using a 2000-candlepower lamp for fifteen minutes.

Vulgaris

Case No. 109. Male. Age, 21. Had acne vulgaris covering all portions of his face for six years. His first actinic-ray treatment was given July 7, 1916, with the air-cooled lamp for four minutes, at a distance of twenty inches; other treatments on the 10th, 12th, 14th, 21st, 25th, 28th, August 1st, 7th, 14th, and 21st. We used the water-cooled lamp on September 11th, 18th, and 20th. Improvement began after the third treatment and continued uninterruptedly.

ADENOMA

Case No. 471. Female. Age, 47. Right breast injured fourteen months ago and has been sore ever since, but for the past two months there has been a burning pain radiating from the nipple to the pectoral muscles. The mass in lower right quadrant of breast was about 3 x 4 cm. in size. Entire lower half of breast painful, sufficiently so to keep her awake at night. No axillary involvement discernible.

Actinic-ray treatments as follows:

DATE	RADIANT LIGHT	ACTINIC RAYS				CLINICAL FINDINGS
		Duration of Treatment		Distance from Patient		
1918	Duration of Treatment	Air-cooled Lamp	Water-cooled Lamp	Air-cooled Lamp	Water-cooled Lamp	
June 10	10 min.	4 min.	1 min.	30 in.	1 in.	
June 13	10 min.	5 min.	¾ min.	20 in.	1 in.	
June 14	10 min.	6 min.	½ min.	20 in.	1 in.	
June 15	10 min.	7 min.	½ min.	16 in.	1 in.	
June 18	10 min.	7 min.	....	16 in.	....	Improved.
July 6	10 min.	4 min.	1 min.	16 in.	1 in.	Slept soundly.
July 8	10 min.	4 min.	....	16 in.	....	
July 11	10 min.	4 min.	1 min.	16 in.	1 in.	
July 13	10 min.	6 min.	....	16 in.	....	No pain.
July 16	10 min.	5 min.	1 min.	16 in.	1 in.	No pain.
Aug. 2	10 min.	5 min.	1 min.	16 in.	1 in.	No pain. Mass smaller. Feels perfectly well.
Aug. 10	10 min.	5 min.	2 min.	16 in.	1 in.	
Aug. 27	10 min.	3 min.	2 min.	16 in.	1 in.	No mass palpable.
Sept. 5	10 min.	4 min.	1 min.	16 in.	1 in.	No mass palpable.
Sept. 19	10 min.	5 min.	....	16 in.	....	No mass palpable.
Sept. 26	10 min.	5 min.	2 min.	16 in.	1 in.	No mass palpable.
Sept. 29	10 min.	5 min.	1 min.	12 in.	1 in.	No mass palpable.
Oct. 11	10 min.	5 min.	2 min.	12 in.	1 in.	
Oct. 21	10 min.	4 min.	4 min.	12 in.	1 in.	No pain, soreness, or lump.
Nov. 4	10 min.	4 min.	2 min.	12 in.	1 in.	No pain, soreness, or lump.

Diagnosis: Adenoma.

Case No. 502. Female. Age, 45. Came to us on August 2, 1918. She had a lump in her right breast which became noticeable one month previous. No pain or soreness. Mass was about 3 x 3 cm. at above date.

Actinic-ray treatments as follows:

DATE	RADIANT LIGHT	ACTINIC RAYS		CLINICAL FINDINGS
		Water-cooled Lamp		
1918	Duration of Treatment	Duration of Treatment	Distance from Patient	
Aug. 2	15 min.	1 min.	Contact	
Aug. 5	15 min.	2 min.	Contact	
Aug. 9	10 min.	2 min.	Contact	
Aug. 16	10 min.	4 min.	Contact	
Aug. 23	10 min.	4 min.	Contact	Mass smaller.
Aug. 30	10 min.	4 min.	Contact	
Sept. 3	10 min.	4 min.	Contact	
Sept. 13	10 min.	3 min.	Contact	Mass nearly gone.
Oct. 16	15 min.	4 min.	Contact	
Oct. 31	15 min.	4 min.	Contact	No mass.

Diagnosis: Adenoma.

Case No. 0116. Female. Age, 31. Her sister had had two operations on her breast, with return after each; tissue pronounced benign. Patient had had pain in outer lower quadrant of left breast for past eighteen months. There was at the time of examination a mass about 3 x 4 cm. in this location which was sensitive to palpation. Patient about four months pregnant.

Her actinic-ray treatments were as follows:

DATE	RADIANT LIGHT	ACTINIC RAYS				CLINICAL FINDINGS
		Duration of Treatment		Distance from Patient		
1918	Duration of Treatment	Air-cooled Lamp	Water-cooled Lamp	Air-cooled Lamp	Water-cooled Lamp	
July 17	10 min.	1 min.	......	10 in.	....	
July 18	10 min.	3 min.	2 min.	10 in.	2 in.	
July 19	10 min.	3 min.	......	10 in.	....	Less pain.
July 29	10 min.	5 min.	......	10 in.	....	Blistered.
July 30	10 min.	5 min.	2 min.	10 in.	2 in.	
July 31	10 min.	5 min.	......	10 in.	....	
Aug. 1	10 min.	5 min.	......	8 in.	....	
Aug. 2	10 min.	....	2 min.	.....	2 in.	Pain very much improved.
Aug. 6	10 min.	6 min.	......	8 in.	....	
Aug. 9	10 min.	6 min.	2 min.	8 in.	2 in.	Blistered.
Aug. 10	10 min.	6 min.	......	8 in.	....	
Aug. 15	10 min.	10 min.	......	8 in.	....	Some soreness; no pain.

(*Continued on next page*)

DATE	RADIANT LIGHT	ACTINIC RAYS				CLINICAL FINDINGS
		Duration of Treatment		Distance from Patient		
1918	Duration of Treatment	Air-cooled Lamp	Water-cooled Lamp	Air-cooled Lamp	Water-cooled Lamp	
Aug. 19	10 min.	10 min.	......	8 in.	....	
Aug. 21	10 min.	....	5 min.	.....	2 in.	
Sep.2-18	10 min.	10 min.	......	8 in.	....	
Sept. 19	10 min.	....	1 min.	.....	1 in.	
Sept. 20	10 min.	....	2 min.	.....	1 in.	
Sept. 21	10 min.	....	3 min.	.....	1 in.	No pain or soreness.
Sept. 28	10 min.	10 min.	......	8 in.	....	No mass. Breast apparently normal. Pregnancy progressing normally.
1919						
Jan. 26	....	....	....	.....	....	Patient delivered of a healthy boy, who is nourished from both breasts.

Diagnosis: Adenoma.

Case No. 106. Female. Age, 54. Six years ago the case was diagnosed as cancer of the breast by Doctors Murphy, Fitzhugh, and Fowler of Chicago, who advised operation, which was refused. January, 1916, the breast became sore; the axillary glands enlarged; nipple retracted; and she could not raise the arm. June 20, 1916, she came to us in this condition. We began treating her with the water-cooled lamp, as she again refused operation. B. P., 110-180.

The first treatment was of five minutes' duration; the second treatment was for three minutes, the third for five minutes, the fourth for twelve minutes, after which she began to use the arm, the axillary glands began to recede, and in ten days she was doing her own housework. After fifteen treatments she was all but well. No axillary glands palpable; lower half of breast sound; upper still contained a smooth mass, which was not painful. July 22, 1916, B. P. was 105-150, which was brought down by autocondensation. August 18, 1916, we changed our diagnosis to adenocystoma, for we could not believe a carcinoma in the same stage would have yielded to the same treatment in the same length of time. No microscopic analysis was made.

In September, 1917, this patient was enjoying the best health she had had in fifteen years. June, 1918, found her in excellent health.

Details of the treatments are as follows:

DATE	ACTINIC RAYS		CLINICAL FINDINGS
	Air-cooled Lamp		
1916	Duration of Treatment	Distance from Patient	
June 20	5 min.	12 in.	Weight, 125 pounds.
June 22	3 min.	8 in.	
June 24	5 min.	4 in.	Axillary glands smaller.
June 27	12 min.	4 in.	Swelling decreased.
June 29	5 min.	2 in.	Decided reaction.
July 3	5 min.	2 in.	Can raise arm freely.
July 6	7 min.	2 in.	No pain in breast or arm.
July 10	10 min.	2 in.	
July 13	8 min.	2 in.	
July 17	10 min.	2 in.	Feeling fine.
July 22	7 min.	2 in.	Breast much improved.
July 26	10 min.	2 in.	
July 31	10 min.	2 in.	
	Water-cooled Lamp		
Aug. 5	4 min.	Contact	
Aug. 11	4 min.	Contact	
Aug. 18	12 min.	Contact	Gained five pounds; weighs 135.
Aug. 24	14 min.	Contact	
Aug. 31	25 min.	Contact	
Sept. 7	30 min.	Contact	Gained one pound; weighs 136.
Sept. 21	22 min.	Contact	
Oct. 4	30 min.	Contact	

Diagnosis: Adenocystoma.

ALOPECIA

Neurotica

Case No. 123B. Female. Age, 44. Had laparotomy performed in June, 1916. Soon after, she began to lose her hair. She began actinic-ray treatments on October 2, 1916, when she was given a seven-minute treatment at a distance of two inches (water-cooled lamp). This was repeated thrice weekly for five months, working up to forty-five minutes for the entire scalp, which resulted in a splendid growth of black hair, although the lost hair was decidedly gray.

Totalis

Case No. 496. Male. Age, 15. Referred by Dr. Hugh Schofield, Chicago. Four years ago had diphtheria, after which he lost all of his hair. Complete alopecia for three years.

His actinic-ray treatments have been as follows:

DATE	ACTINIC RAYS				CLINICAL FINDINGS
	Duration of Treatment		Distance from Patient		
1918	Air-cooled Lamp	Water-cooled Lamp	Air-cooled Lamp	Water-cooled Lamp	
July 23	3 min.	......	12 in.	....	Complete alopecia.
July 27	5 min.	......	12 in.	....	
Aug. 3	10 min.	......	10 in.	....	
Aug. 10	18 min.	......	10 in.	....	
Aug. 17	25 min.	......	8 in.	....	
Aug. 24	30 min.	......	6 in.	....	Slight amount of hair.
Aug. 31	30 min.	......	6 in.	....	
Sept. 7	....	2 min.	.....	1 in.	
Sept. 14	....	2 min.	.....	1 in.	
Sept. 21	....	2 min.	.....	1 in.	
Sept. 28	....	2 min.	.....	1 in.	
Oct. 5	....	3 min.	.....	1 in.	Fair growth of hair starting.
Oct. 12	....	3 min.	.....	1 in.	
Oct. 19	....	4 min.	.....	1 in.	
Nov. 1	....	5 min.	.....	1 in.	Growth continuing.
Nov. 9	....	5 min.	.....	1 in.	
Nov. 16	....	6 min.	.....	1 in.	
Nov. 23	....	5 min.	.....	1 in.	Head shaved.
Nov. 30	....	7 min.	.....	1 in.	Hair growing nicely.
Dec. 7	....	7 min.	.....	1 in.	
Dec. 14	....	6 min.	.....	1 in.	Head shaved.
Dec. 21	....	8 min.	.....	1 in.	
Dec. 28	30 min.	......	6 in.	....	Hair growing nicely.
1919					
Jan. 4	40 min.	......	5 in.	....	Splendid growth of hair.

ASTHMA

Bronchial

Case No. 4. Male. Age, 9. First severe attack of asthma when seven months old. Subsequent attacks were severe and at short intervals. Circumcision in 1914 improved his general health, but other asthmatic attacks recurred, though at longer intervals.

In June and July, 1916, we began the radiant-light treatments, followed by the actinic rays from the air-cooled lamp of three minutes' duration, at a distance of twenty inches, and improvement was manifest after the first treatment. A few treatments in 1917 gave him complete relief for twelve months, after which he had another short series of treatments, with almost complete relief. No asthma during 1918.

AUTOINTOXICATION

Case No. 116. Female. Age, 39. Postoperative (laparotomy) autointoxication, complicated with adhesions and constipation.

First treatment, July 15, 1916, consisted of five minutes under the air-cooled lamp, at a distance of thirty inches, and ten minutes of abdominal vibration. This was repeated on the 16th and 17th, when there was less pain and a general feeling of improvement. She was severely burned the first treatment; so the others were reduced to three minutes. Other treatments, on the 20th, 22d, 25th, 28th, and 30th, were increased to four minutes, as were those of August 4th, 11th, and 17th, at which time she was feeling fine and had gained five pounds. Bulgarian milk, hydrastis muriate 2x, and strychnine phosphate 2x were the other measures used.

BARTHOLINITIS

Case No. 546. Female. Age, 43. Began having pain in left Bartholin gland one month ago. It was so sore that walking was difficult.

December 14, 1918, gave a three-minute treatment with the water-cooled lamp, using a solid-quartz applicator and compression. On the 16th there was much less pain and a second three-minute treatment was given, followed by relief of pain. On the 21st a third treatment of three minutes removed all soreness, although three-minute treatments were given on the 23d and 30th, when the case was dismissed without operative work of any kind.

BRONCHITIS

Case No. 136. Male. Age, 37. Suffering with bronchitis for four days. Coughing constantly; respiration difficult.

March 8, 1918, we gave him a fifteen-minute treatment of radiant light and two minutes of actinic rays (air-cooled lamp), at a distance of sixteen inches. On the 9th he was feeling better, with less cough and less pain. Repeated the treatment, which was all that was required.

We kept in touch with him for the three days following, but no other treatments were needed. No drugs were given.

Case No. 137. Male. Age, 35. Became ill ten days ago. Had pain throughout the chest; chilly at times; coughed severely. When he came to us on August 14, 1916, his temperature was 101.2; pulse, 100.

The first treatment consisted of twenty minutes of radiant light and three minutes of actinic rays from the air-cooled lamp, at a distance of twenty inches. On the 15th the temperature was 100; pulse, 90, when the treatment was repeated, increasing the actinic rays to four minutes. The following day the temperature was 99.

Treatments were repeated on the 17th and 18th, when he received twenty minutes of radiant light and five minutes of actinic rays, at a distance of fifteen inches. He was dismissed at this time with a temperature of 98; pulse, 72.

Diagnosis: Bronchitis.

CANCER

CANCER is too important a subject to dismiss with a few case reports; therefore we shall give the reader a few facts regarding this most terrible of all maladies. First, we do not know the real etiology of cancer in any form; but we do know that epitheliomas must have epithelial tissue from which to start, that adenocarcinomas start in adenoid tissue, and that sarcomas start in embryonal connective tissue about muscles or bones. Just when and how a normal cell becomes an outlaw and separated from the central nervous system is not known, but it is probably due to protracted malnutrition and prolonged irritation which start the retrograde metamorphosis. Cancer cells are abnormal only in arrangement and location, which differentiates them from the normal cells. They also have the power of locomotion.

Sarcomas are as malignant as carcinomas, though they have their origin in embryonal connective tissue; the small-celled and soft forms being more malignant than the large-celled and hard forms. Melanotic sarcomas are most malignant, while angiosarcomas are least malignant.

Sarcomas have a well-developed blood supply—however, not through true blood vessels, but through spaces lined with endothelium. The sarcomas are frequently associated with other forms of tumors which in themselves are benign; i. e., fibromas, myxomas, lymphomas, osteomas, etc.

The usual sites of carcinomas are the mucous membranes of the mouth, esophagus, stomach, intestines, uterus, bladder, vagina, vulva, and skin. The adenomas in which carcinomas frequently develop are in the breast, endometrium, stomach, tonsils, prostate, lymphatic glands, etc.

The cancer cell is a normal cell gone wrong; in short, it is a true outlaw. Whatever the etiology, given a beginning, the balance of the growth is a proliferation of the same type of cells, with destruction of the adjacent normal cells, and this is true no matter where it is deposited by metastasis, for it is universally adaptable and generally true to type. This proliferation of cells continues until their base of supplies is cut off; then begins the destructive process, which in some cases can be definitely determined from day to day. Erosion and rapid growth are characteristic of all cancers after destruction has begun.

The cancer cell is parasitic, living upon and destroying the normal cell with which it is in contact. It is transmitted by infiltration and through both lymph and blood streams; so there may be metastasis to any part of the body. This is particularly true of squamous-celled epitheliomas and adenocarcinomas, the lymph streams and glands being readily invaded by them, but this is not so true of sarcomas, which seldom spread through the lymphatics beyond the first chain of glands encountered. The lymphatic glands will destroy a limited number of cancer cells. Cancers are all autoinoculable but are not infectious or contagious so far as is known at the present time.

Infiltration of surrounding tissues from cancer starts as a single connected mass separating the normal cells. Single cells may become detached and form new foci. Micropscopic section of the mass always shows *irregular masses of epithelial cells* surrounded by connective tissue and blood vessels instead of the regular arrangement of the normal epithelial layer. To a large extent these masses follow the lymphatics.

Cancer of the cervix spreads much more rapidly than cancer of the body of the uterus and involves the parametrium early. This is due to the fact that the glands of the cervix dip down into the muscle tissue, while those of the body do not extend beyond the endometrium, thus forming a natural barrier, and to the fact that the lymphatics from this region drain into the sacral, hypogastric, and superior illiac glands, making their complete removal next to impossible even in the early stages; therefore cancer of the cervix is very seldom removable by cutting at any stage with any hope of complete recovery. Cautery is without doubt the best method of treating these cases. Carcinoma of the cervix spreads rapidly until it reaches the internal os, where it is greatly retarded, as this portion of the uterus acts as a natural barrier. The occlusion of the internal os in these cases means pyometra. The lymphatics of the body of the uterus join with those of the tube and ovary and drain into the lumbar glands, while the lymphatics of the round ligament drain into the inguinal glands.

Metastasis and death are more rapid in chorioepithelioma than in any other variety of cancer. Death from chorioepithelioma may occur in three or four weeks but usually in from three to six months. Death from carcinoma occurs in from one to three years, average eighteen months, while death from sarcoma occurs in from one to four years, average two years. Deaths due to metastasis from carcinoma of the cervix or fundus are rare, most cases dying from septic or hypostatic pneumonia, although deaths from general sepsis are common. During late stages, cancer patients suffer most from sepsis, next from pain. Cachexia is a sure sign of dissemination and indicates toxemia and should be known as a late symptom. Retraction of the nipple is a late symptom of breast cancer. When cancer of the cervix infiltrates the vaginal wall, destruction of life is almost certain.

Early diagnosis may be made by chemical methods. It is also made by finding papules, nodules, or disintegrating issue, which is characterized by the ease with which it bleeds on manipulation, and by the fact that this bleeding is increased when copper sulphate in a 10- to 20-per-cent solution is applied; but these are all late symptoms. Microscopic diagnosis confirms all other methods.

Menstrual irregularities in women past thirty-five and up, and particularly when past forty-five, should be watched carefully, and vaginal discharges during these ages should be as carefully analyzed. There is no typical vaginal discharge from uterine cancer. Any discharge which at *irregular times* contains blood should at once excite suspicion. Where it is possible, a frozen section should be made of a portion of the diseased tissue, but this should not be done unless one is ready to continue the destruction of the diseased area, which is best done by cautery (Percy method) or by fulguration or electrocoagulation (Clark method) and in some cases by the ionic method of Massey. Each has its particular field of usefulness.

The ionic method probably sterilizes the tissue for an area of two inches beyond the electrode if a current of 1000 milliamperes is continued for one hour or more. This method is particularly adapted to cancer of the cervix, which, as before stated, is practically inoperable by cutting at any stage, so far as the expectation of recovery is concerned. What is true of cancer of the cervix is true also of cancer of the rectum or anal region. ("Ionic Surgery in the Treatment of Cancer," by G. B. Massey, M. D., pages 43-45.)

Where the growth is large, as in breast cases, it is best to cut it out with cautery; when small, as on the face or lip, fulguration makes an ideal method. When large areas are diseased and are not readily accessible, as about the face and mouth, it is often advisable to cauterize as much as possible, immediately following this with electrocoagulation (D'Arsonval current) for the less accessible parts.

Where electrocoagulation is used, place under the back a large pad to which one pole is attached; to the other pole attach a pointed applicator for use in the cancerous area. Use from 500 to 1500 milliamperes of the D'Arsonval current for a period of time sufficient to destroy the diseased tissue. Where it is impossible to remove all the diseased tissue, as in uterine cancer, it is best to destroy the overgrowth of tissue with a solid cautery-iron heated to a cherry red, and then cook the surrounding tissue by cooling the cautery-iron to a point where it does not carbonize (just steams), and continue this for from ten to thirty minutes, or even more in advanced cases.

Remember that pain is one of the last symptoms to appear and does not occur until there is disturbance of nerve function either by impingement, exposure, or destruction of nerve filaments. Remember also that hemorrhage is a late symptom, occurring only after there is destruction of tissue including the vessel walls. And again remember that cancer patients suffer most of all from sepsis, which is also the cause of the nutritive disturbances from which these patients suffer.

Adenomas are growths of normal tissue elements abnormally arranged and are probably incipient carcinomas. Scirrhus forms may be due to Nature's efforts to check the disease by contracting the tissues.

Primary malignancy is always single in location and indicates the only time when recovery is probable. Blood examinations are of but little value in detecting early malignancy. Late in the disease erythrocytes and hemoglobin both fall from 50 to 75 per cent. All late-stage cancer cases with erosion of tissue have mixed infection which must be dealt with as effectively as when it occurs alone.

Cancer cases should not be called cured for at least five years after dismissal, and to be sure one should wait much longer. However, if a given case goes one year without a sign of recurrence, recovery is probable.

By cancer we mean
- Carcinomas
  - Adeno-
  - Epithelio-
  - Chorioepithelio-
- Sarcomas
  - Osteo-
  - Lympho-
  - Fibro-
  - Myxo-
  - Melano-
  - Angio- (not liable to metastasis)

CARCINOMA

Case No. 194. Female. Age, 41. Physician. During January and February, 1916, she had an opaque leucorrhea which did not contain visible blood, but after her March period the flow was bloody and more or less continuous. There was no pain. In April she discovered a cauliflower growth in the vagina which broke off and bled when touched. May 10, 1916, she was curretted and cauterized with a Percy Cautery at Hahnemann Hospital, Chicago. Laboratory diagnosis: carcinoma. The same treatment was carried out at the same hospital on June 14, 1916, and the specimen examined by Dr. Wilson was pronounced carcinoma.

On June 28th she came to our office and we began using the actinic rays from the air-cooled lamp. The first treatment was of five minutes' duration, with the light thrown into the vagina through a vaginal speculum. At this time there was a great deal of odor. June 30th we gave a second treatment, when there was but little odor, and on July 3d there was none. She had three treatments a week until September 1, 1916, varying in time from five to twelve minutes. On the 27th of September, 1916, we did a panhysterectomy, and the following is the report of our pathologist, Dr. W. H. Wilson: "There is some hyperemia of the endometrium and the glands are slightly cystic. There is no evidence of carcinoma."

September 1, 1917, she returned to the practice of medicine and was enjoying the best of health, with no sign of a return of the disease. September, 1918, she was still in the best of health, with no signs of a return of the trouble.

As the treatments of this case cover a period of over two years, we shall not give the details of each, as they were very much alike. For the first month we used an air-cooled lamp, the time varying from five minutes for the first to twenty-three minutes for the last, with the lamp-shade against the vaginal speculum. Beginning the second month, we used the water-cooled lamp, starting with four minutes, using a medium-sized

Sharp applicator through a vaginal speculum, and this method is still continued. The length of the treatments was gradually increased until they were of ten minutes' duration. A few treatments of twenty minutes' duration were given, but were found to be too severe, causing an intense burning and itching for several days thereafter, but they did not cause destruction of normal tissue. After the first six months the treatments were twice weekly for six months, then once weekly for six months, and then once in two weeks.

During 1918 she had fourteen actinic-ray treatments. She says she seems to feel better when she has treatments occasionally.

CARCINOMA

Cervix

Case No. 168B. Female. Age, 38. Her history March 6, 1916, was as follows: Married seventeen years but never pregnant; had been flowing for two weeks; flow dark; went one week over last month; had had a serous discharge for the past year which of late had had a decided odor. Examination showed slight erosion of the cervix with softening of the tissue. Copper test was negative; so the case was watched carefully until June 5, 1916, when we began treatment with the actinic rays, and the last of June the conditions appeared normal.

On January 3, 1917, she reported that she had not flowed for three months, but on January 22d she started flowing, and on February 7th she reported that she was still flowing, with no pain, no clots, but felt ill all over. On February 17th she was still flowing and there was considerable odor; so we sent her to Hahnemann Hospital, Chicago, where on February 22, 1917, she was anesthetized and three specimens taken from separate portions of the cervix, which bled most easily when touched. Frozen sections were immediately examined by Dr. W. H. Wilson, our pathologist, which showed glandular infiltration. This was, without doubt, a beginning carcinoma of the cervix. The cervix was heavily cauterized with a Percy Cautery and the fundus

DATE	ACTINIC RAYS		CLINICAL FINDINGS
	Water-cooled Lamp		
1917	Duration of Treatment	Distance from Patient	
Oct. 27	4 min.	½ in.	
Oct. 30	5 min.	½ in.	Shows improvement.
Nov. 6	6 min.	½ in.	
Nov. 9	4 min.	½ in.	Much improved.
Nov. 15	3 min.	½ in.	
Nov. 22	4 min.	½ in.	
Nov. 30	5 min.	½ in.	
Dec. 6	6 min.	½ in.	Nearly smooth.
Dec. 10	5 min.	½ in.	
Dec. 20	5 min.	½ in.	
1918			
Jan. 31	5 min.	½ in.	Smooth.
Mar. 22	4 min.	½ in.	Smooth.
May 17	6 min.	½ in.	Smooth.
Oct. 30	4 min.	½ in.	Skin smooth and appears normal.
Dec. 6	2 min.	½ in.	Apparently well.

Nasal

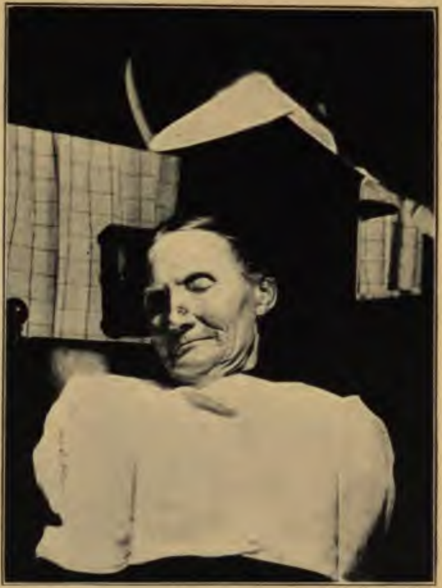
Case No. 392. Female. Age, 56. Referred by Dr. L. L. Wescott, Chicago. Papule started on right side of nose two years ago. Was healed one year ago, but soon reappeared. Itches at times. Has been scabbed over for several months.

Treatments as follows:

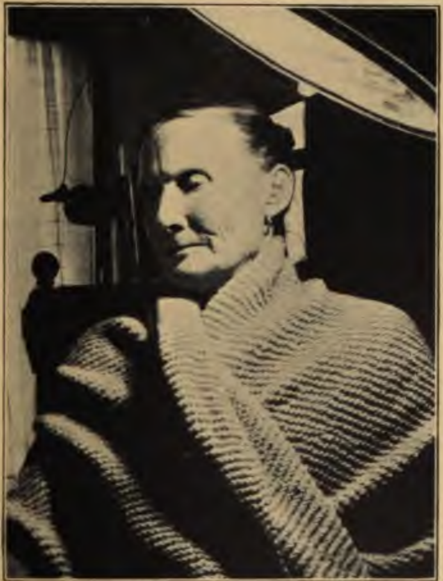
DATE	ACTINIC RAYS		CLINICAL FINDINGS
	Water-cooled Lamp		
1918	Duration of Treatment	Distance from Patient	
Jan. 26	6 min.	½ in.	
Feb. 2	5 min.	½ in.	Improved.
Feb. 11	6 min.	½ in.	Much improved.
Feb. 23	5 min.	½ in.	Skin smooth.
Mar. 23	4 min.	½ in.	Skin smooth.

Diagnosis: Epithelioma.

Two pictures of Case No. 179—Epithelioma



Before treatment.



After treatment.

Plate V

Nasal

Case No. 179. Female. Age, 61. Referred by Dr. A. R. Johnston, Lakeside Hospital, Chicago. Papule started on her nose in December, 1916. Was operated at Lakeside Hospital on January 25, 1917, after which it spread so rapidly that by February 7, 1917, the sore was larger than a quarter. The Lakeside Hospital diagnosis was epithelioma.

Treatments were given as follows:

DATE	ACTINIC RAYS		CLINICAL FINDINGS
	Water-cooled Lamp		
1917	Duration of Treatment	Distance from Patient	
Feb. 7	2 min.	½ in.	
Feb. 8	3 min.	½ in.	
Feb. 9	4 min.	½ in.	
Feb. 10	5 min.	½ in.	Improved.
Feb. 12	6 min.	½ in.	
Feb. 14	5 min.	½ in.	Improved.
Feb. 17	6 min.	½ in.	
Feb. 19	6 min.	½ in.	Much improved.
Feb. 26	6 min.	½ in.	
Mar. 5	6 min.	½ in.	
Mar. 19	2 min.	½ in.	Nose well.

Diagnosis: Epithelioma.

Stomach

Case No. 247. Male. Age, 51. Has had "stomach trouble" for twenty years; intestinal fermentation for the past eight years; has had large quantities of mucus in stools for the past seven months; has lost flesh rapidly for the past three months.

We began treating him with actinic rays on June 4, 1917. Details are as follows:

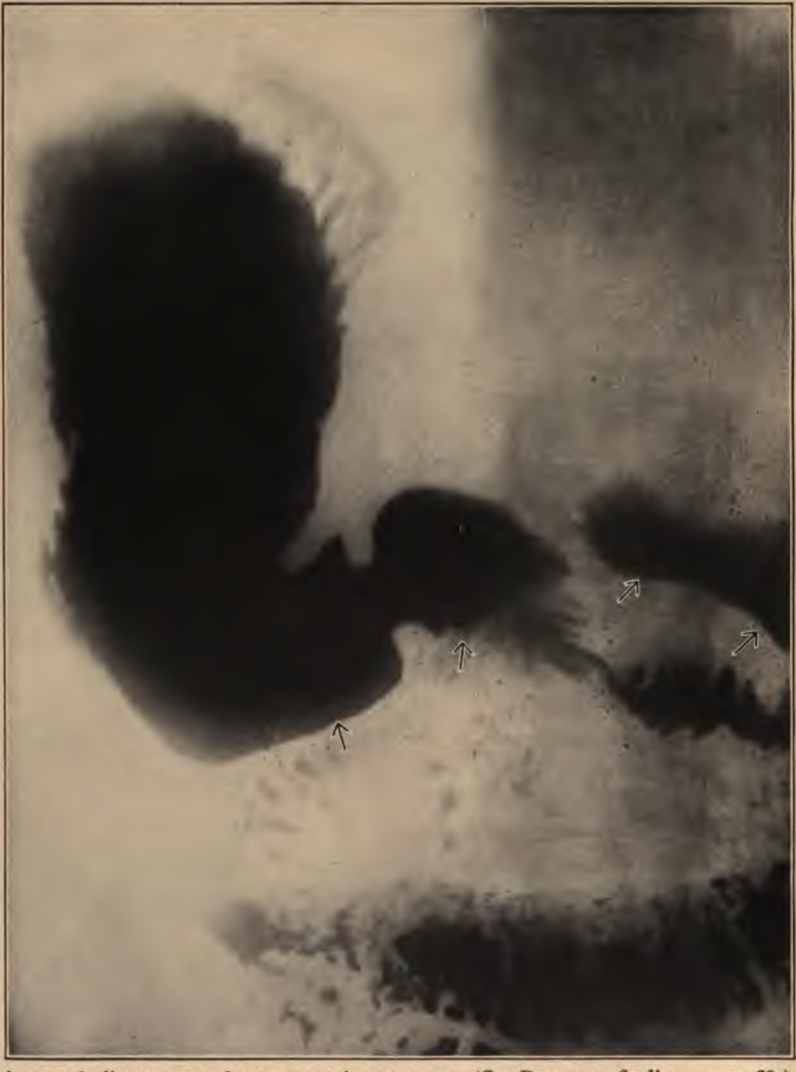
DATE	RADIANT LIGHT	ACTINIC RAYS		CLINICAL FINDINGS
		Air-cooled Lamp		
1917	Duration of Treatment	Duration of Treatment	Distance from Patient	
June 4	....	3 min.	20 in.	Cachectic.
June 5	....	4 min.	18 in.	
June 6	....	9 min.	16 in.	
June 7	....	10 min.	14 in.	Mucus in stools.
June 12	....	13 min.	12 in.	
June 13	....	20 min.	12 in.	
July 3	....	15 min.	10 in.	No mucus. Feels better.
July 5	....	15 min.	10 in.	Less cachexia.
July 7	....	17 min.	10 in.	Sleep improved.
July 12	....	20 min.	10 in.	Pain in epigastrium.
July 19	....	20 min.	10 in.	
July 20	10 min.	15 min.	10 in.	No pain.
July 23	10 min.	15 min.	10 in.	Bowels improved.
Aug. 1	10 min.	10 min.	10 in.	
Aug. 4	10 min.	12 min.	10 in.	Feels better in every way.
Aug. 6	10 min.	8 min.	10 in.	Feels better in every way.
Aug. 10	10 min.	10 min.	10 in.	
Aug. 13	10 min.	10 min.	10 in.	Actinic-ray treatments at home until December 8th, when he was referred to Dr. Roemer, Waukegan, Ill., for traction.
1918				
May 16	....	....	....	Reports a gain of 10 pounds (145).
Oct. 15	....	....	....	Working every day.

His regular weight for years was about 180 pounds. At the time he came to us it was 153 pounds; later it rose to 163 and fell to 143; and on October 15, 1918, it was 151 pounds. (See plates VI and VII.)

Roentgen findings as follows:

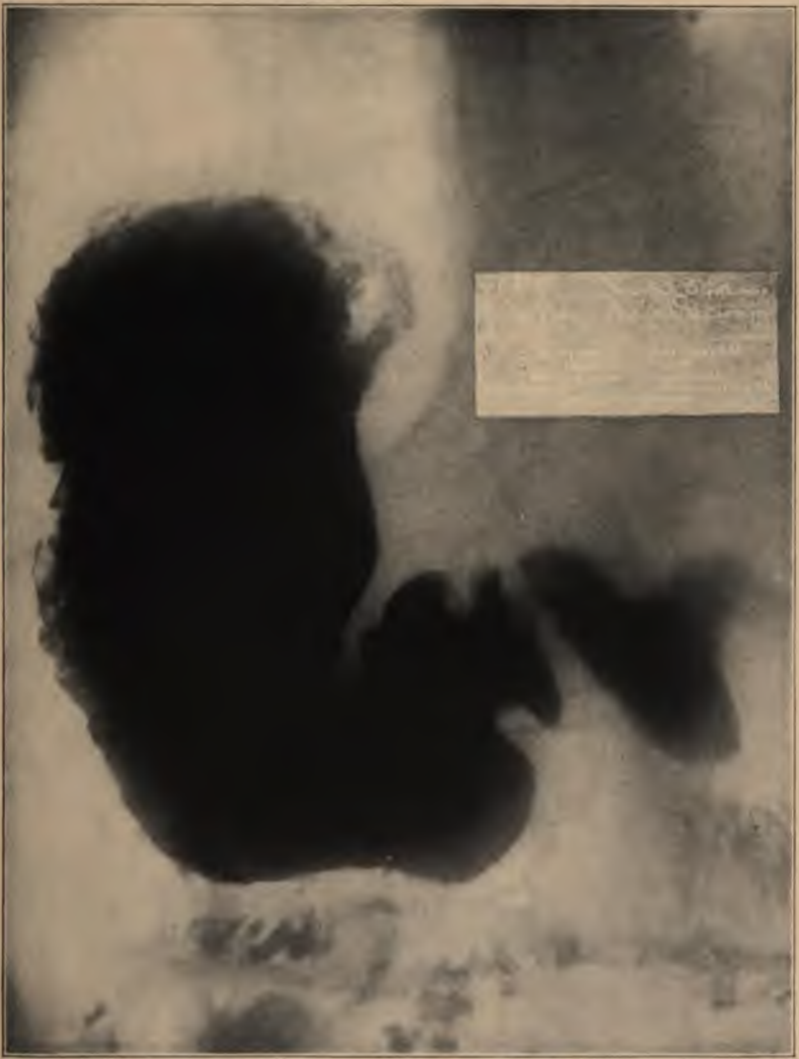
Roentgenograms
of
Case No. 247

(Page 67)



Arrows indicate area of extra-gastric pressure. (See Roentgen findings, page 69.)

Plate VI



The same stomach is here pictured as in Plate VI and shows a decrease or absence of extra-gastric pressure.

Plate VII

MAXIMILIAN J. HUBENY, M. D.
25 East Washington Street
Chicago

ROENTGEN FINDINGS OF MR. E.
July 16, 23, 1917. No. 13158.

Preliminary fluoroscopic examination of chest and abdomen revealed nothing unusual:

Stomach:

Opaque meal entered stomach in usual manner, showing good tonus of organ.
Size: Appears normal.
Shape: Orthotonic.
Position: Greater curvature extends one finger above umbilicus in upright position.
Peristalsis: Moderate; evacuation commences early and is complete in six hours.
Caput: Well defined; irregular in outline, especially along upper edge. Somewhat enlarged and distorted, due to infiltration.

Stomach:

Six-hour examination shows opaque meal in duodenum, jejunum, ileum, cecum, and ascending colon.

Twenty-four-hour examination shows opaque meal in cecum, ascending, transverse, descending, and pelvic colons, also rectum.

Arrow-heads point to circular outline of stomach, caput, and duodenum as if conforming itself to pressure excited by extra-gastric tumor.

The injection of an opaque enema was unattended with any features of significance.

Findings indicate duodenal ulcer and probable tumor of pancreas or hypernephroma.

Stomach

Case No. 065. Female. Age, 31. Referred by Dr. F. H. Cutler, Cedar Falls, Ia. Stomach trouble began ten years ago, at which time she had an exploratory operation at Rochester, Minn., which revealed nothing, and the abdomen was closed without further operative interference. Five years ago she had an operation for appendicitis.

She came to us February 15, 1917, with the history that she had been more or less ill for the past three years (stomach trouble practically all the time). She returned to us on July 3, 1917. We had an X-ray examination (both fluoroscopic and plate) by Dr. Maximilian Hubeny, 25 East Washington Street, Chicago, which showed a filling defect at pyloric end of stomach (greater curvature) of about three inches in extent.

We began actinic-ray treatments on July 5, 1917, and within one week she improved and continued to do so, gaining two pounds the second week and fourteen pounds in all.

The X-ray makes clear the diagnosis of gastric ulcer and possibly of carcinoma grafted upon the site of the old ulceration.

The treatments were started with the air-cooled lamp for one minute and increased one minute each day until thirteen minutes were given. Distance at beginning was twenty-four inches and was decreased to fourteen. At the end of two months, to use her expression, "I have not felt so well in years. I can't find enough work to do."

Diagnosis: Carcinoma.

SARCOMA

Hemangioma (*Occipital*)

Case No. 345. Female. Age, 42. Referred by Dr. L. M. Johnson, Arrowsmith, Ill. In June, 1917, the patient noticed a small lump on the left occipital region which was sore on pressure. In August, 1917, it was the size of an English walnut and was removed under a local anesthetic September 1, 1917. It immediately started to grow again, and on October 8th was removed by Dr. E. P. Sloan of Bloomington, Ill., and a specimen sent to the Herzog Laboratory of Chicago, where it was pronounced a round-celled sarcoma, and the condition was said to be incurable.

The patient came to us October 15, 1917, while the stitches were still in place and surrounded by an edematous area of about 10 x 15 cm., extending well down into the posterior cervical region. The posterior cervical glands were enlarged to the size of a small English walnut.

Treatments were commenced at once with the actinic rays and were given as follows:

DATE	RADIANT LIGHT	ACTINIC RAYS				CLINICAL FINDINGS
1917	Duration of Treatment	Duration of Treatment		Distance from Patient		
		Air-cooled Lamp	Water-cooled Lamp	Air-cooled Lamp	Water-cooled Lamp	
Oct. 15	15 min.	6 min.	....	20 in.	.....	
Oct. 16	20 min.	7 min.	....	16 in.	.....	
Oct. 17	20 min.	10 min.	....	14 in.	.....	Stitches out.
Oct. 18	20 min.	11 min.	....	12 in.	.....	Blood clot visible through separation of wound.
Oct. 20	20 min.	12 min.	....	12 in.	.....	
Oct. 21	15 min.	12 min.	....	12 in.	.....	Mass smaller.
Oct. 23	15 min.	13 min.	....	12 in.	.....	
Oct. 25	15 min.	14 min.	....	12 in.	.....	
Oct. 26	12 min.	15 min.	....	12 in.	.....	Very little pain.
Oct. 31	8 min.	15 min.	6 min.	12 in.	1 in.	
Nov. 1	8 min.	15 min.	10 min.	12 in.	1 in.	Mass still smaller.
Nov. 3	8 min.	18 min.	12 min.	10 in.	1 in.	Improves steadily.
Nov. 9	8 min.	18 min.	10 min.	12 in.	1 in.	Blistered.
Nov. 17	7 min.	18 min.	10 min.	12 in.	1 in.	
Nov. 20	8 min.	18 min.	12 min.	15 in.	1 in.	Edema gone. Tumor softening.
Nov. 22	8 min.	18 min.	20 min.	12 in.	1 in.	Very much improved.
Nov. 26	8 min.	18 min.	20 min.	12 in.	1 in.	No pain.
Nov. 28	8 min.	18 min.	15 min.	12 in.	1 in.	
Dec. 5	8 min.	18 min.	15 min.	12 in.	1 in.	

December 8th we removed the soft portion in the left occipital region with a Percy Cautery at Hahnemann Hospital, Chicago. On removal of the soft area, the outer table of the skull was found to be eroded through to the diploe over an area of about 3 cm. in diameter. There was considerable bleeding, which was controlled by the half-hour's cauterization this area received. The cautery blade was passed into the diploe for about a cm.

The mass was sent to Dr. W. H. Wilson, the pathologist at Hahnemann Hospital, who pronounced it a hemangioma. At this time a stereoscopic picture was taken at the Michigan Boulevard Building X-ray Laboratory, Chicago, which showed three shadows in the occipital bone to the left of the median line, and their diagnosis was hemangioma of the diploe. They also made the statement that a sarcoma arising from the diploe is the most frequent tumor giving this X-ray appearance.

A specimen was then sent to Dr. Herzog, who made the first diagnosis of round-celled sarcoma, and after examining the second specimen he still insisted his first decision was correct; i. e., round-celled sarcoma.

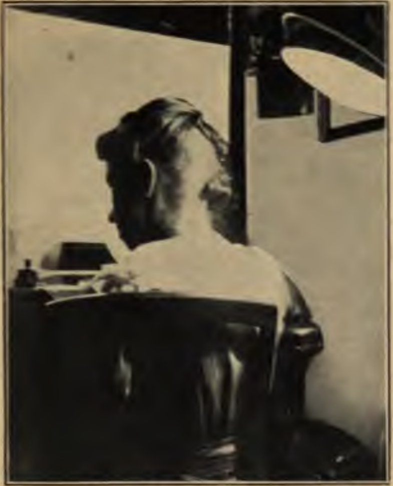
Following cauterization there was no pain, and the patient left the hospital in forty-eight hours. Treatments were resumed:

DATE	RADIANT LIGHT	ACTINIC RAYS				CLINICAL FINDINGS
1917	Duration of Treatment	Duration of Treatment		Distance from Patient		
		Air-cooled Lamp	Water-cooled Lamp	Air-cooled Lamp	Water-cooled Lamp	
Dec. 9	7 min.	15 min.	15 min.	12 in.	Contact	
Dec. 12	7 min.	15 min.	15 min.	12 in.	Contact	Pack removed. Slight bleeding.
Dec.	7 min.	15 min.	15 min.	12 in.	Contact	Best night she has had up to this time.
Dec. 18	7 min.	15 min.	15 min.	12 in.	Contact	
Dec. 24	7 min.	15 min.	15 min.	12 in.	Contact	
Dec. 29	7 min.	15 min.	15 min.	12 in.	Contact	

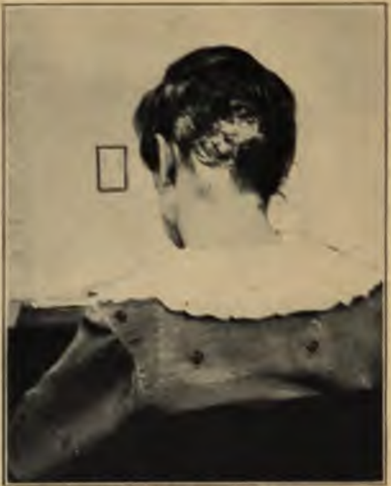
January 4th bleeding which proved to be a spurting artery started from the center of the cauterized area. She was awakened by the warm blood soaking her night-clothes. The flow was easily controlled by pressure, which was maintained for over one hour while waiting for the ambulance to take her to Augustana Hospital for cauterization. The bleeding was readily controlled with the cautery; no anesthetic was used. Twelve hours later she was in good condition; left the hospital and took her treatments as usual.

DATE	RADIANT LIGHT	ACTINIC RAYS				CLINICAL FINDINGS
1918	Duration of Treatment	Duration of Treatment		Distance from Patient		
		Air-cooled Lamp	Water-cooled Lamp	Air-cooled Lamp	Water-cooled Lamp	
Jan. 5	7 min.	15 min.	15 min.	12 in.	Contact	
Jan. 14	8 min.	15 min.	15 min.	12 in.	Contact	Cauterized places filling in nicely.
Jan. 21	6 min.	12 min.	15 min.	12 in.	Contact	A new spot discovered about one inch to right of cauterized area.
Jan. 31	5 min.	10 min.	35 min.	12 in.	Contact	
Feb. 5	5 min.	10 min.	40 min.	12 in.	Contact	
Feb. 8	5 min.	10 min.	50 min.	12 in.	Contact	

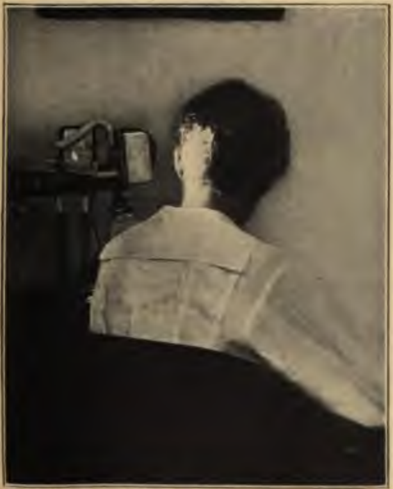
Four pictures of Case No. 345—Sarcoma



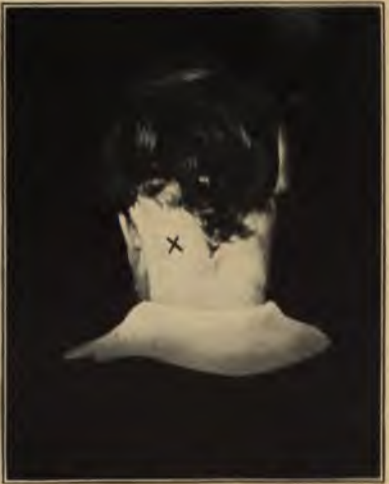
Appearance when patient came to us.



The "x" shows the exposed brain tissue, above which is the cauterized area.



Showing position of water-cooled lamp when treating granulating wounds. Wound nearly healed.



The "x" shows same area as in picture above. Wound healed.

Plate VIII

On the 9th of February one of the old areas was recauterized. Fifty minutes was required for this. The following day there was no pain and she left the hospital in good condition.

Treatments were resumed as follows:

DATE	RADIANT LIGHT	ACTINIC RAYS				CLINICAL FINDINGS
1918	Duration of Treatment	Duration of Treatment		Distance from Patient		
		Air-cooled Lamp	Water-cooled Lamp	Air-cooled Lamp	Water-cooled Lamp	
Feb. 12	5 min.	10 min.	30 min.	12 in.	Contact	
Feb. 15	5 min.	10 min.	35 min.	12 in.	Contact	
Feb. 22	5 min.	10 min.	35 min.	12 in.	Contact	Scab came off.
Feb. 28	5 min.	10 min.	35 min.	12 in.	Contact	Pulsation noticed.
Mar. 5	5 min.	10 min.	20 min.	12 in.	Contact	Removed a portion of the scab and some bone.
Mar. 11	5 min.	10 min.	30 min.	12 in.	Contact	Some bleeding after treatment.
Mar. 18	10 min.	10 min.	10 min.	12 in.	Contact	
Mar. 28	10 min.	5 min.	5 min.	12 in.	Contact	
April 1	10 min.	5 min.	10 min.	12 in.	Contact	Pain below cauterized area.
April 13	10 min.	5 min.	5 min.	12 in.	Contact	Considerable pulsation.
April 26	10 min.	5 min.	5 min.	12 in.	Contact	Around lower area pulsation increasing.

For fear of hemorrhage, she was returned to Hahnemann Hospital, where on May 1st the entire pulsating area was cauterized for forty-five minutes. The cauterized area extended to the mastoid process, thus destroying the posterior occipital artery. There was no hemorrhage. At this time it was discovered that both tables of the skull were destroyed over an area of about 4 cm. in diameter and that the dura mater had been thoroughly cauterized. The rough edges of the bone were beveled off with a ronguer and she was put to bed in good condition and had a good night's rest following the operation.

On the 3d there was considerable pulsation from the brain tissue and on the 4th the carbonized tissue was removed, revealing the exposed brain tissue. On the 6th tissue granulation had started. At this time the protruding brain was the size of half an English walnut. By the 14th the granulation tissue had started over the brain area as well as in the scalp tissue. During this time her temperature did not rise above 101° and the pulse above 100. She sat up each day and felt perfectly well except for a pain which spread forward over the left temporal into the supraorbital region. At this time the ears, eyes, and nose were examined by Dr. Edgar J. George, Chicago, and found to be normal. The pain gradually decreased, so that by the 25th it had almost disappeared. On the 15th there was some odor, but the surfaces were granulating nicely, and by the 21st the odor had disappeared.

Actinic-ray treatments were started on May 28th and were as follows:

DATE	RADIANT LIGHT	ACTINIC RAYS				CLINICAL FINDINGS
1918	Duration of Treatment	Duration of Treatment		Distance from Patient		
		Air-cooled Lamp	Water-cooled Lamp	Air-cooled Lamp	Water-cooled Lamp	
May 28	10 min.	5 min.	5 min.	14 in.	4 in.	
May 29	10 min.	10 min.	4 min.	14 in.	4 in.	
June 1	10 min.	10 min.	4 min.	14 in.	4 in.	Using the third button on the rheostat.
June 4	10 min.	5 min.	4 min.	14 in.	4 in.	
June 7	10 min.	10 min.	5 min.	12 in.	4 in.	Soft tissue of scalp adhering to brain. The greatest protrusion of brain at this time amounted to a mass the size of half an English walnut.
June 10	10 min.	10 min.	5 min.	12 in.	4 in.	
June 15	10 min.	10 min.	5 min.	12 in.	4 in.	Adhesions formed between scalp and brain tissue.
June 20	10 min.	10 min.	5 min.	12 in.	4 in.	
June 25	10 min.	10 min.	5 min.	12 in.	4 in.	On the second button of rheostat.
July 2	10 min.	10 min.	5 min.	12 in.	6 in.	
July 12	10 min.	10 min.	5 min.	12 in.	6 in.	
July 25	10 min.	10 min.	2 min.	12 in.	6 in.	Second button.

(*Continued on next page*)

DATE	RADIANT LIGHT	ACTINIC RAYS				CLINICAL FINDINGS
		Duration of Treatment		Distance from Patient		
1918	Duration of Treatment	Air-cooled Lamp	Water-cooled Lamp	Air-cooled Lamp	Water-cooled Lamp	
Aug. 1	10 min.	10 min.	5 min.	12 in.	6 in.	Small piece of bone removed. Granulating area now about 2 x 4 cm. in diameter. Brain retracted to the level of the outer table of the skull.
Aug. 12	10 min.	10 min.	5 min.	12 in.	6 in.	No signs of any further extension of the disease; wound healing nicely; patient feeling in the best of health.
Aug. 23	10 min.	10 min.	5 min.	12 in.	6 in.	
Sept. 1	10 min.	10 min.	5 min.	12 in.	6 in.	
Sept. 11	10 min.	10 min.	4 min.	12 in.	6 in.	Loose bone removed.
Sept. 23	10 min.	10 min.	4 min.	12 in.	6 in.	Brain all covered with integument.
Sept. 26	10 min.	10 min.	4 min.	12 in.	6 in.	Area of bone, 1 x 1 cm.; still exposed.
Oct. 2	....	....	....	.....	.....	Went home to report monthly.
Nov. 12	....	....	....	.....	.....	Removed a small piece of bone from occiput.
Nov. 16	....	....	....	.....	.....	Returned home with the area entirely healed and with no evidence of any return.
1919						
Feb. 1	....	....	....	.....	.....	In splendid condition; no signs of a return.

Fibrosarcoma (Spinal)

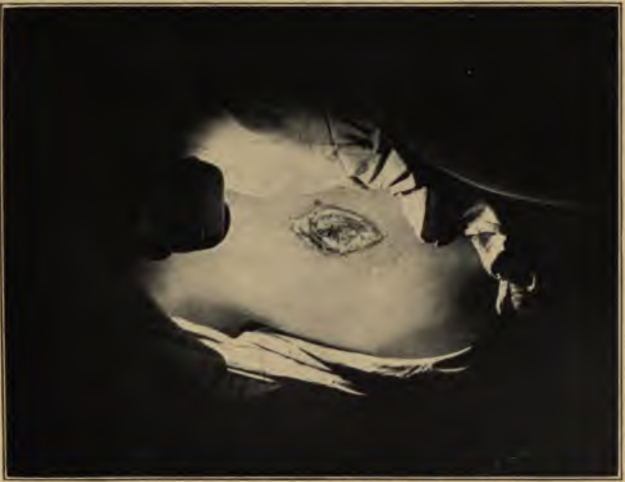
Case No. 489. Female. Age, 16. Referred by Dr. Oscar Jones, Indianapolis, Ind. In August, 1917, she noticed a small lump near the spinous process of the eighth dorsal vertebra, left side. It did not trouble her; so she gave it no attention until November, 1917, when it began to pain and she consulted a doctor, who applied ointments until May, 1918, at which time she changed doctors and was told that it must be operated at once.

The operation was performed on May 14, 1918, by Dr. T. B. Noble, Indianapolis, Ind., who, after a microscopic examination of the excised tissue, pronounced it an osteosarcoma. She was in the hospital for six weeks, but the wound did not heal. She was told that it was a sarcoma and that nothing could be done for her. When referred to us, the mass was about 5 x 10 cm. in size, running from the sixth to the tenth dorsal vertebra, left side. Running across the top of the mass was an unhealed wound from which was coming a pus discharge.

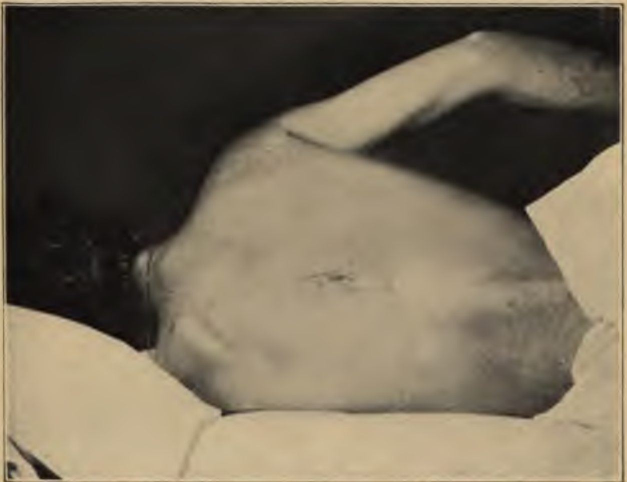
She came to us July 11th, and we immediately sent her to the Michigan Boulevard Building X-Ray Laboratory for a stereoscopic picture, which macroscopically did not show bone involvement. We therefore sent her to Hahnemann Hospital, Chicago, where, on the 12th, we removed the mass with a Percy Cautery. In order to remove the growth it was necessary to remove the erector-spinæ muscles, exposing the spinous and transverse processes of the vertebra. The excision was carried outward to the angle of the ribs.

When she awoke from the anesthetic, the pain which she had had for months had disappeared. On the 13th her temperature was 102°; pulse 150; and there was no pain. She was in splendid condition, having passed a good night. On the 14th her temperature was 101.4°; pulse 130; no pain. On the 15th her temperature was 100°; pulse 96; complained of being hungry. On the 16th temperature was 99°; pulse 100; she was able to sit up in bed. On the 17th her temperature was 98.6°; pulse 80; and she was without ache or pain.

Two pictures of Case No. 489—Fibrosarcoma



Showing wound one week after operation.



Showing scar as it appeared eighty-one days after operation.

Plate IX

The Columbus Medical Laboratory report is as follows:

COLUMBUS MEDICAL LABORATORY
21 North State Street
Chicago
CASE NO. 28800

Chicago, July 15, 1918.

Dr. T. Howard Plank:

The specimen of tissue from L. N. shows:

The specimen is a fair-sized piece of solid tissue. On section it shows a differentiated round mass about 2 cm. in diameter not connected with the skin.

Microscopic examination shows a fibromyxoma. The blood-vessel changes are not enough for sarcoma now. It is only a moderate degree suspicious.

THE COLUMBUS LABORATORIES,
A. Gehrmann.

On the 19th we started actinic-ray treatments as follows:

DATE	RADIANT LIGHT	ACTINIC RAYS		CLINICAL FINDINGS
		Water-cooled Lamp		
1918	Duration of Treatment	Duration of Treatment	Distance from Patient	
July 19	....	2 min.	4 in.	
July 20	....	3 min.	4 in.	
July 22	....	3 min.	4 in.	
July 23	....	3 min.	4 in.	Granulating nicely.
July 24	....	5 min.	4 in.	
July 25	....	5 min.	4 in.	
July 26	20 min.	5 min.	4 in.	
July 27	20 min.	5 min.	4 in.	
July 28	10 min.	5 min.	4 in.	
July 29	10 min.	5 min.	4 in.	
July 31	10 min.	5 min.	4 in.	
Aug. 1	10 min.	5 min.	4 in.	Wound shows healthy granulations. Bones covered.
Aug. 3	10 min.	5 min.	4 in.	
Aug. 5	....	......	.....	Returned to hospital for partial closure of wound.
Aug. 7	30 min.	5 min.	4 in.	
Aug. 8	30 min.	5 min.	4 in.	
Aug. 9	40 min.	5 min.	4 in.	
Aug. 10	40 min.	5 min.	4 in.	
Aug. 12	40 min.	5 min.	4 in.	Wound healing nicely; no pain.
Sept. 30	....	......	....	Went home.

The patient is to report at office once a month. October 27th the cavity was completely filled. There was no pain and no sign of a return. November 24th she reported no sign of a return. December 20, 1918, no return. January 15, 1919, no sign of a return.

CHANCROID

Case No. 262. Male. Age, 25. Penial chancroid of six weeks' standing. Gave a two-minute actinic-ray treatment July 2, 1917, with the water-cooled lamp, at a distance of four inches. Improvement was noticed in twenty-four hours. Other treatments were given on the 3d, 5th, 7th, 9th, 11th, and 13th, when he was discharged.

CYST

Retention

Case No. 017. Female. Age, 23. Cyst about the size of a large hazelnut on right side of nose, extending to inner canthus. She noticed it first when a child, but it had been growing rapidly of late. Her first actinic-ray treatment, October 28, 1916, was of two minutes' duration, under slight compression, with the water-cooled lamp. Her second and last treatment was on October 30th, and when examined ten days after and later no evidence of a cyst was to be found.

Retention

Case No. 251. Female. Age, 18. Retention cyst on right cheek about 2 cm. in diameter. Started about four months ago. First treatment January 20, 1917, for three minutes with the water-cooled lamp. On the 23d, 27th, and 30th treatments were five, seven, and eight minutes in duration, after which there was very little evidence of the cyst, but on July 24th she returned, as it seemed to be refilling. We then lanced it, getting one-half dram of thin serum. She was then given a six-minute treatment under compression, using the water-cooled lamp, and on the 28th a seven-minute treatment. August 2d, 9th, and 16th treatments of seven, ten, and twelve minutes were given. Since then no cyst can be seen or palpated.

CYSTITIS

Case No. 476. Female. Age, 34. Has had pain in her bladder for some weeks, with frequent painful urination. First actinic-ray (water-cooled lamp) treatment given July 3, 1918, for seven minutes, through a vaginal speculum turned sidewise.

Treatments repeated on the 6th, 8th, 10th, 12th, and 16th, when they were increased to ten minutes. Almost complete relief after the third treatment.

Postoperative

Case No. 485. Female. Age, 37. Postoperative cystitis for more than a year. Pain almost constant, which was increased on urination. Cystoscope showed inflamed area in trigone and posterior urethra.

First actinic-ray (water-cooled lamp) treatment, July 9, 1918, was of five minutes' duration, through a vaginal speculum, through which the medium-sized Clark applicator was introduced. A second treatment of seven minutes was given on the 11th, after which there was some improvement. On the 13th her treatment was of ten minutes' duration, but, as it blistered her badly, it was decreased to six minutes on the 16th, and to five on the 23d, at which time there was very little evidence of the former trouble.

Diagnosis: Cystitis.

DYSMENORRHEA

Hypothyroid

Case No. 427. Female. Age, 23. Periods about every seventy days, lasting six days and very painful for the first three days. Last period November 22, 1917. Began actinic-ray treatments December 17, 1917.

DATE	RADIANT LIGHT	ACTINIC RAYS		SPINAL VIBRATION	CLINICAL FINDINGS
		Air-cooled Lamp			
1917	Duration of Treatment	Duration of Treatment	Distance from Patient	Duration of Treatment	
Dec. 17	10 min.	3 min.	20 in.	5 min.	
Dec. 18	10 min.	4 min.	16 in.	5 min.	
Dec. 19	10 min.	5 min.	14 in.	5 min.	
Dec. 20	10 min.	5 min.	12 in.	5 min.	
Dec. 21	10 min.	6 min.	12 in.	5 min.	Less pain.
1918					
Jan. 4	10 min.	7 min.	12 in.	5 min.	
Mar. 6	10 min.	8 min.	12 in.	5 min.	
Mar. 14	10 min.	10 min.	12 in.	5 min.	More pain, but flowing. Interval, 53 days.
April 26	15 min.	10 min.	12 in.	5 min.	Flowing; slight pain. Interval, 38 days.
May 21	25 min.	10 min.	12 in.	5 min.	Flowing; slight pain. Interval, 26 days.
June 28	10 min.	10 min.	12 in.	5 min.	Flowing; slight pain. Interval, 35 days.
July 26	10 min.	10 min.	12 in.	5 min.	Flowing; no pain. Interval, 28 days.

Membranous

Case No. 327. Female. Age, 26. Pain each month so severe that she had to stay in bed until she passed a membrane. Lately there is a drawing pain across the lower abdomen between periods. Last period August 25, 1917.

Her actinic-ray treatments consisted of the following:

DATE	RADIANT LIGHT	ACTINIC RAYS Air-cooled Lamp		CLINICAL FINDINGS
1917	Duration of Treatment	Duration of Treatment	Distance from Patient	
Sept. 12	15 min.	......	.....	Headache.
Sept. 13	15 min.	2 min.	18 in.	No headache.
Sept. 14	15 min.	3 min.	14 in.	
Sept. 19	15 min.	5 min.	10 in.	General ill feeling.
Sept. 28	15 min.	5 min.	10 in.	Flowing some; distress.
Oct. 1	15 min.	5 min.	10 in.	Flowing; pain much improved.
Oct. 6	15 min.	6 min.	10 in.	Much improved generally.
Oct. 19	15 min.	7 min.	10 in.	Feeling fine.
Oct. 23	15 min.	5 min.	10 in.	Flowing; no pain.
Nov. 20	15 min.	6 min.	10 in.	Flowing; no pain.
Dec. 19	15 min.	7 min.	10 in.	Flowing; no pain.

A more grateful patient would be difficult to find.

Diagnosis: Membranous dysmenorrhea.

ECZEMA

General

Case No. 109. Female. Age, 59. She has had eczema the greater part of the time since she was four years old, and has been treated more or less all that time. There was scarcely a part of her body that was not eczematous. Her right hand was blistered, cracked, and bleeding; her face was covered with vesicles, as were her feet.

June 23, 1916, she was given a four-minute actinic-ray treatment with the air-cooled lamp. Her next treatments were June 26th, 29th, July 3d, 6th, 10th, and 14th, at which time she was blistered badly, so had no further treatments until August 3d. Another was given August 9th, and the last August 18, 1916, when she was free from eczema. No local treatment of any kind was used. This case was reported well in 1918.

Marginatum

Case No. 330. Female. Age, 20. Came to us November 27, 1917, with eczema marginatum in both groins. The itching was intense and she had scratched portions of the area until they bled. Her treatments with the actinic-ray (water-cooled lamp) were from two to four minutes, every second day. No itching after the third treatment. At the end of one month she was well. Calendula ointment was used after the treatments to reduce the burning and the friction.

Diagnosis: Eczema marginatum.

EROSION OF CERVIX

Case No. 367. Female. Age, 26. Married for one year, but never pregnant, although she desired to be. Examination showed an acid leucorrhea which irritated the skin about the vulva. An area of the cervix about the size of a quarter was eroded and bled easily when touched. This bleeding was controlled immediately when a 20-per-cent solution of copper sulphate was applied. The husband was found to be normal and his spermatozoa were normal.

We began treatments with the actinic rays on August 25, 1917, giving a two-minute treatment, which was increased to ten minutes thrice weekly. Magnesium-sulphate douches were used. On January 2, 1918, she reported herself pregnant.

ERYTHEMA

Torso

Case No. 155. Female. Age, 50. Eruption started on abdomen in December, 1916, spreading upward over abdomen and thorax, front and back. Itching intense. Had used both internal and external remedies with but slight relief. Came to us February 14, 1917, in this condition.

Treatments as follows:

DATE	ACTINIC RAYS		CLINICAL FINDINGS
	Air-cooled Lamp		
1917	Duration of Treatment	Distance from Patient	
Feb. 14	3 min.	24 in.	
Feb. 15	4 min.	20 in.	
Feb. 16	4 min.	20 in.	Slightly burned.
Feb. 19	6 min.	16 in.	Improved.
Feb. 21	8 min.	14 in.	
Feb. 23	8 min.	14 in.	
Mar. 1	10 min.	14 in.	Much improved.
Mar. 5	10 min.	14 in.	Case dismissed.

This case reported at the office several times, but needed no further treatments.

General

Case No. 442. Male. Age, 41. Rheumatism for two months, commencing February 1, 1918, and for the past month had had constant eruption over entire body, with itching so severe that it was impossible for him to procure enough sleep, though he had tried various measures.

Treatments with the air-cooled lamp were given as follows:

DATE	ACTINIC RAYS		CLINICAL FINDINGS
	Air-cooled Lamp		
1918	Duration of Treatment	Distance from Patient	
April 23	4 min.	20 in.	
April 24	5 min.	16 in.	No relief.
April 25	6 min.	14 in.	Slight relief.
April 29	7 min.	12 in.	Much relief.
May 1	9 min.	10 in.	Complete relief.

Diagnosis: Erythema.

GASTRIC ULCER

Case No. 214. Male. Age, 38. Draftsman. Came to us March 25, 1917, with a history of periodical attacks of pain in the upper abdomen lasting for a week or two, covering a period of some nine years. This attack had lasted since the first of January, 1917. Pain started about one and one-half hours after eating and was so severe that it required three to six quarts of milk a day and one quart at night to permit him to work and sleep. This was his method of stopping the pain when he came to us.

After one treatment of five minutes, he slept over twelve hours without awakening; no medicine was used. After two treatments with the actinic rays of five and six minutes, respectively, he was able to go one-half day without the milk and without pain. After eight treatments, the longest one of seven minutes' duration, he was eating regular meals and sleeping all night, and this without any pain. He had fourteen treatments in all between March 25 and May 7, 1917, when he felt so well that he stopped treatment without our consent.

October 5, 1917, he returned, saying that he had been having pain again for the past two weeks.

His actinic-ray treatments were as follows:

DATE	RADIANT LIGHT	ACTINIC RAYS		CLINICAL FINDINGS
		Air-cooled Lamp		
1917	Duration of Treatment	Duration of Treatment	Distance from Patient	
Mar. 25	15 min.	5 min.	16 in.	See general statement immediately preceding.
Mar. 26	15 min.	6 min.	14 in.	
Mar. 27	15 min.	6 min.	16 in.	
Mar. 28	15 min.	5 min.	14 in.	
April 3	15 min.	5 min.	14 in.	
April 5	15 min.	5 min.	14 in.	
April 6	15 min.	6 min.	14 in.	
April 11	15 min.	7 min.	12 in.	
April 13	15 min.	7 min.	12 in.	
April 17	15 min.	7 min.	12 in.	
April 18	15 min.	7 min.	12 in.	
April 21	15 min.	7 min.	12 in.	
April 26	15 min.	7 min.	12 in.	
April 30	15 min.	7 min.	12 in.	
May 7	15 min.	7 min.	12 in.	
Oct. 5	20 min.	(Actinic-ray treatments not given on these dates.)		Pain for past two weeks.
Oct. 6	20 min.			Slightly improved.
Oct. 8	20 min.			
Oct. 9	20 min.			Improved for two hours.
Oct. 12	20 min.			
Oct. 15	20 min.	4 min.	20 in.	Less pain.
Oct. 18	20 min.	5 min.	16 in.	Very little pain.
Oct. 26	15 min.	6 min.	14 in.	No pain.
Nov. 1	20 min.	8 min.	12 in.	No pain.
Nov. 14	10 min.	10 min.	12 in.	In splendid condition.

Case No. 167. Female. Age, 26. Lost fifteen pounds in 1916; still further loss in 1917. Came to us March 12, 1918, suffering from pain in epigastric region, which was worse after eating but somewhat relieved mornings. Treatments as follows:

DATE	RADIANT LIGHT	ACTINIC RAYS		CLINICAL FINDINGS
		Air-cooled Lamp		
1918	Duration of Treatment	Duration of Treatment	Distance from Patient	
Mar. 12	10 min.	....	.....	
Mar. 14	10 min.	2 min.	20 in.	
Mar. 18	10 min.	4 min.	18 in.	Improved.
Mar. 20	10 min.	5 min.	12 in.	No pain.
Mar. 23	10 min.	5 min.	12 in.	Diarrhea.
Mar. 28	10 min.	7 min.	12 in.	Slight pain after meals.
April 1	10 min.	8 min.	12 in.	No pain.
April 12	10 min.	10 min.	12 in.	Very much improved.
April 19	15 min.	10 min.	12 in.	Dismissed.

Later reports give no return of the trouble. December 8, 1918, she reported a gain of twenty-five pounds in weight.

Diagnosis: Gastric ulcer.

GASTRITIS

Chronic

Case No. 233. Female. Age, 48. Constant pain in upper gastric region for several months. Bowels constipated.

The following treatments were given with the air-cooled lamp:

DATE	RADIANT LIGHT	ACTINIC RAYS		CLINICAL FINDINGS
		Air-cooled Lamp		
1917	Duration of Treatment	Duration of Treatment	Distance from Patient	
April 10	15 min.	......	.....	
April 11	15 min.	......	.....	
April 13	15 min.	2 min.	24 in.	
April 16	20 min.	3 min.	20 in.	Slight improvement.
April 20	20 min.	4 min.	16 in.	Pain in lower abdomen.
April 25	20 min.	5 min.	16 in.	Slightly improved.
April 27	20 min.	5 min.	14 in.	
May 1	15 min.	5 min.	14 in.	Much improved.
May 7	15 min.	5 min.	14 in.	
May 14	15 min.	6 min.	14 in.	
May 21	15 min.	6 min.	14 in.	
May 28	10 min.	8 min.	14 in.	Feeling very well.
June 4	10 min.	8 min.	12 in.	
June 11	10 min.	8 min.	12 in.	
June 18	10 min.	8 min.	12 in.	
June 28	10 min.	8 min.	12 in.	
July 2	12 min.	5 min.	12 in.	Distress in epigastrium.
Aug. 2	12 min.	4 min.	12 in.	
Sept. 5	15 min.	6 min.	12 in.	Improved.
Oct. 10	....	......	.....	No symptoms.

GOITER

Case No. 065. Female. Age, 31. We are frequently asked if the actinic rays will cure goiter. With the exception of the present case, we have not used them, on account of the blistering. This case had been burned with X-rays, and in treating the X-ray burn we incidentally treated the goiter.

The treatments were:

DATE	ACTINIC RAYS		CLINICAL FINDINGS
	Air-cooled Lamp		
1917	Duration of Treatment	Distance from Patient	
Feb. 15	4 min.	20 in.	
Feb. 16	10 min.	12 in.	
	Water-cooled Lamp		
Feb. 18	12 min.	12 in.	Burned very badly.
July 5	2 min.	1 in.	Burned.
July 7	2 min.	1 in.	Blistered.
July 9	2 min.	1 in.	
July 12	2 min.	1 in.	
July 14	3 min.	1 in.	Blistered.
July 17	3 min.	1 in.	
July 23	2 min.	1 in.	
July 29	4 min.	1 in.	
July 31	2 min.	1 in.	
Aug. 4	4 min.	1 in.	
Aug. 15	2 min.	1 in.	Goiter very much improved, as was the X-ray burn. Went home.
1918			
Nov.	......	.....	Symptoms negative; gland normal in size.

HAY FEVER

Case No. 192. Female. Age, 55. Has had hay fever for ten consecutive years. Actinic-ray treatments to the interior of the nose were given with a solid-quartz applicator and the water-cooled lamp.

DATE	ACTINIC RAYS		CLINICAL FINDINGS
	Water-cooled Lamp		
1917	Duration of Treatment	Distance from Patient	
July 30	2 min.	Contact	Nose clearer.
Aug. 1	3 min.	Contact	Nose clearer.
Aug. 4	4 min.	Contact	
Aug. 6	4 min.	Contact	Less sneezing.
Aug. 15	4 min.	Contact	Very little sneezing.
Aug. 18	4 min.	Contact	Very little sneezing.
Aug. 20	4 min.	Contact	Very little sneezing.
Aug. 22	3 min.	Contact	Very little sneezing.
Aug. 24	3 min.	Contact	Eyes do not itch.
Aug. 27	3 min.	Contact	No sneezing.
Sept. 3	3 min.	Contact	Breathes freely.
Sept. 7	3 min.	Contact	No hay fever.
Sept. 27	......	....	Reports the least hay fever in years.

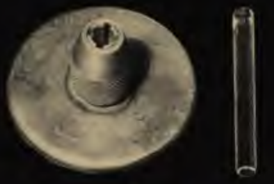
Case No. 314. Female. Age, 36. Has had hay fever for eight consecutive years. As she lives out of the city, she took her actinic-ray treatments two weeks previous to the expected attack. We used the water-cooled lamp with the solid-quartz applicator, treating the interior of the nose as follows:

DATE	ACTINIC RAYS		CLINICAL FINDINGS
	Water-cooled Lamp		
1917	Duration of Treatment	Distance from Patient	
Aug. 4	5 min.	Contact	
Aug. 5	4 min.	Contact	
Aug. 6	4 min.	Contact	Breathing more freely.
Aug. 7	5 min.	Contact	Breathing more freely.
Aug. 8	6 min.	Contact	
Aug. 9	7 min.	Contact	
Aug. 10	6 min.	Contact	
Aug. 29	......	....	Reported she was having the least hay fever she had had in years.

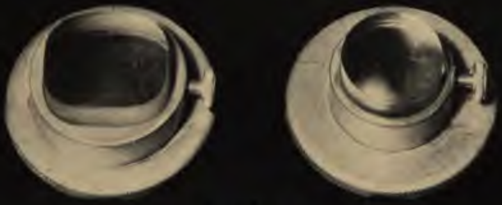
Case No. 484. Female. Age, 42. Hay fever in September, 1917. Sneezing constantly with lachrymation for several days past. Actinic-ray treatments with water-cooled lamp to interior of nose with solid-quartz applicator used in contact with the turbinates.

DATE	ACTINIC RAYS		CLINICAL FINDINGS
	Water-cooled Lamp		
1918	Duration of Treatment	Distance from Patient	
July 8	3 min.	Contact	
July 10	3 min.	Contact	Improved.
July 11	3 min.	Contact	Sneezed once during twenty-four hours.
July 12	3 min.	Contact	Sneezed once during twenty-four hours.
July 17	3 min.	Contact	Much improved.
July 21	3 min.	Contact	No sneezing.

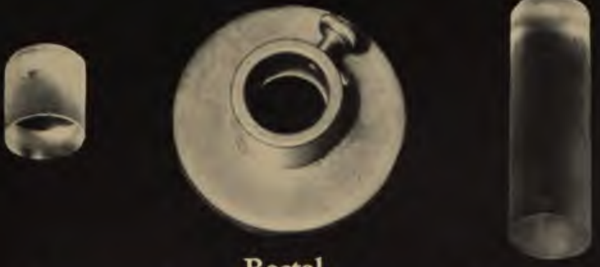
Solid-Quartz Applicators



Nasal
For treatment of hypertrophied turbinates



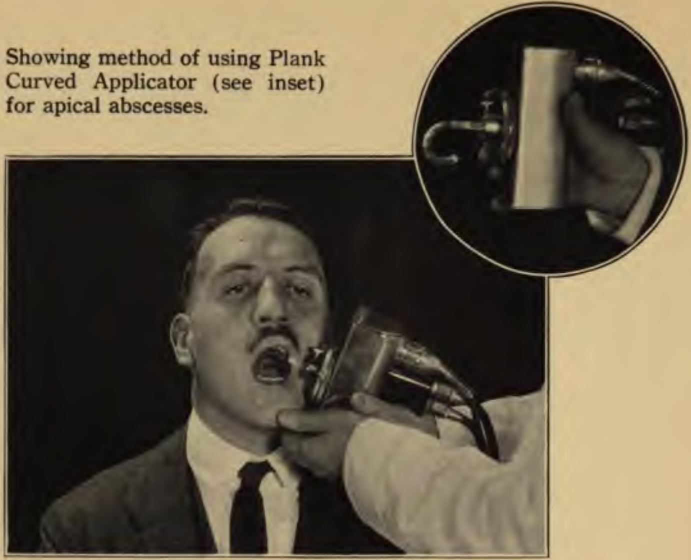
Surface
For compression



Rectal
For treatment of hemorrhoids, fissures, and fistulas

Plate X

Showing method of using Plank Curved Applicator (see inset) for apical abscesses.



Showing method of treating larynx with Plank Curved Applicator (see inset).

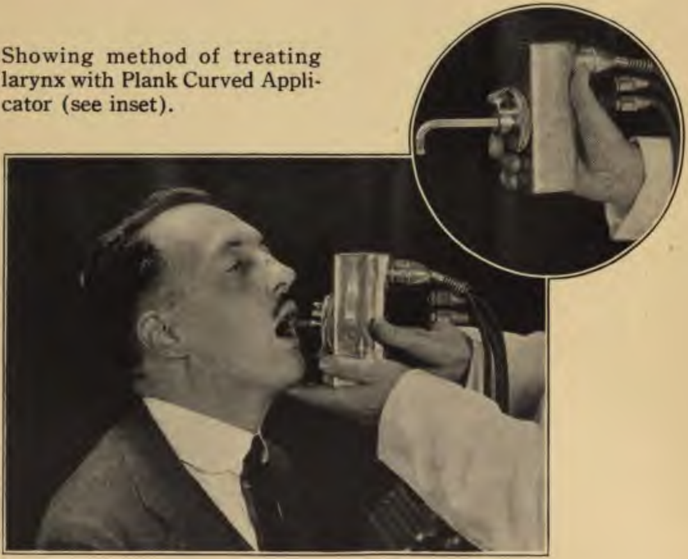


Plate XI

HEMORRHOIDS

Case No. 510. Male. Age, 45. Hemorrhoids for twenty-five years. Operated ten years ago without relief. Began treatment with galvanism in October, 1918. Contraction of tumors started after first four treatments, but pain was still severe. On November 17, 1918, gave a two-minute actinic-ray treatment with the water-cooled lamp, using a special quartz applicator and compression, which relieved the pain very markedly. On November 20th gave a three-minute treatment; a four-minute one on the 24th; and on the 27th a five-minute treatment, after which there was no pain and very little protrusion. December 4th gave a six-minute treatment, and on the 15th a second six-minute treatment, which blistered quite badly but gave almost complete relief from the hemorrhoids.

HEPATITIS

Case No. 74B. Male. Age, 16. Had been getting more and more jaundiced for the past week and for several days had felt tired all the time. Pulse, 50; temperature, 98°. Liver enlarged.

He was given the following actinic-ray treatments:

DATE	ACTINIC RAYS		CLINICAL FINDINGS
	Air-cooled Lamp		
1916	Duration of Treatment	Distance from Patient	
Oct. 22	4 min.	24 in.	
Oct. 23	5 min.	20 in.	Blistered.
Oct. 24	4 min.	20 in.	
Oct. 26	6 min.	20 in.	Much improved.
Oct. 28	6 min.	20 in.	Less jaundiced.
Oct. 30	7 min.	18 in.	Still slightly jaundiced but feeling fine.

Several subsequent reports showed continued improvement and no return of the trouble.

HERPES PROGENITALIS

Case No. 06. Female. Age, 20. Herpetic eruption about genitals for several days; some pain. Her first treatment, on July 30, 1916, was of one minute's duration, with the water-cooled lamp, at a distance of two inches.

DATE	ACTINIC RAYS		CLINICAL FINDINGS
	Water-cooled Lamp		
1915	Duration of Treatment	Distance from Patient	
Aug. 1	1 min.	2 in.	
Aug. 3	2 min.	2 in.	Relief.
Aug. 6	2 min.	2 in.	Improving.
Aug. 10	2½ min.	2 in.	Complete relief.

Relief after the second treatment. Disappearance of eruption after the fifth treatment.

HERPES ZOSTER

Case No. 64B. Male. Age, 50. Herpes zoster over right lower costal region. Eruption confluent, very heavy, and painful enough to prevent sleep.

The following actinic-ray treatments were given:

DATE	ACTINIC RAYS		CLINICAL FINDINGS
	Air-cooled Lamp		
1916	Duration of Treatment	Distance from Patient	
May 1	3 min.	12 in.	
May 2	6 min.	12 in.	Slept all night.
May 3	4 min.	12 in.	Slept all night.
May 4	4 min.	13 in.	Pain slight but irritating.
May 5	5 min.	16 in.	Eruption dry, followed by complete disappearance.

HODGKIN'S DISEASE

Case No. 355. Female. Age, 26. Referred by Dr. J. R. Mitchell, Chicago. Two years ago had left axillary glands removed; at the same time there were other glands palpable in both supraclavicular spaces and in right axillary space. At the present time the mass in the right axillary is about 7 x 9 cm.; both supraclavicular spaces are distended, although there is no swelling of the submaxillary glands.

The doctor who operated on the left axillary glands pronounced it a case of Hodgkin's disease.

Her blood count, made at Abbott's Laboratory, Chicago, on coming to us in October, 1917, was:

Erthrocytes	5,200,000
Hemoglobin	78%
Color index	76
Leucocytes	12,800
Neutrophiles	78%
Lymphocytes	10%
Mono-nuclears	9%
Eosinophiles	3%
Poikilocytes	Few

July 18, 1918, the blood count was:

Erythrocytes	4,400,000
Leucocytes	20,000
Hemoglobin	70%
Color index	79
Poikilocytes	Few
Lymphocytes	12%
Endothelial cells	2%
Neutrophiles	84%
Blood platelets	Apparently not increased

This examination was made Dr. W. H. Wilson, pathologist at Hahnemann Hospital, who adds: "This is rather a high count for a Hodgkin's, but it is against tuberculosis and leukemia."

Her actinic-ray treatments were as follows:

DATE	RADIANT LIGHT	ACTINIC RAYS				CLINICAL FINDINGS
		Duration of Treatment		Distance from Patient		
1917	Duration of Treatment	Air-cooled Lamp	Water-cooled Lamp	Air-cooled Lamp	Water-cooled Lamp	
Nov. 3	....	1 min.	2 min.	20 in.	Contact	
Nov. 5	....	3 min.	3 min.	18 in.	Contact	
Nov. 9	....	3 min.	3 min.	16 in.	Contact	
Nov. 28	....	8 min.	5 min.	14 in.	Contact	
Nov. 30	....	8 min.	5 min.	12 in.	Contact	Supraclavicular glands smaller.
Dec. 4	10 min.	10 min.	5 min.	10 in.	1 in.	
Dec. 12	10 min.	10 min.	6 min.	10 in.	1 in.	Axillary glands much improved.
1918						
Jan. 2	10 min.	10 min.	8 min.	10 in.	1 in.	
Jan. 17	10 min.	10 min.	7 min.	10 in.	1 in.	General condition much improved.
Feb. 20	10 min.	10 min.	9 min.	10 in.	1 in.	Pain in submaxillary region.
Mar. 2	10 min.	10 min.	5 min.	10 in.	1 in.	General condition improving. Glands smaller.
Mar. 25	10 min.	10 min.	4 min.	10 in.	1 in.	Glands markedly smaller.
April 3	....	....	....	.....	.....	Axillary glands normal.
April 17	....	....	....	.....	.....	Removed tonsils complete at the Hahnemann Hospital.
April 25	....	....	....	.....	.....	Throat in good condition.
May 3	....	....	....	.....	.....	Submaxillary glands enlarging.
May 6	15 min.	10 min.	3 min.	10 in.	1 in.	
May 9	20 min.	10 min.	5 min.	10 in.	1 in.	
May 15	20 min.	20 min.	3 min.	10 in.	1 in.	
May 28	10 min.	10 min.	6 min.	10 in.	1 in.	
June 3	10 min.	10 min.	10 min.	10 in.	1 in.	
June 6	30 min.	10 min.	7 min.	10 in.	1 in.	
June 15	10 min.	6 min.	6 min.	2 in.	2 in.	Glands gradually receding.
June 25	10 min.	10 min.	5 min.	10 in.	2 in.	
June 29	10 min.	10 min.	5 min.	10 in.	2 in.	
July 1	10 min.	10 min.	5 min.	10 in.	2 in.	General appearance improving and all glands receding.
July 10	10 min.	10 min.	7 min.	5 in.	2 in.	
July 16	10 min.	10 min.	7 min.	5 in.	2 in.	

INFECTION

Finger

Case No. 132. Male. Age, 30. Hand swollen to wrist; axillary glands enlarged and painful when he came to us October 11, 1916. We lanced the finger and used the water-cooled lamp for two minutes. When he returned next day the axillary glands were not sore, and the hand was less swollen and less painful. We repeated the treatment and discharged him on the 13th after his third actinic-ray treatment of two minutes.

Hand

Case No. 01. Male. Age, 40. Came to our office one evening in September, 1917, with an infection over the left thenar eminence which he said was throbbing, and that the pain extended almost to the elbow. He requested that we apply a wet dressing. We informed him that we had a better method, and used actinic rays with the water-cooled lamp in contact over the infected area for two and one-half minutes, after which he could move the thumb without pain, and the following morning there was neither pain nor soreness. No other application of any kind was used; no dressings applied.

Hand

Case No. 049. Female. Age, 40. Infection started in minimi digiti in June, 1916, and spread throughout hand and forearm. It had been opened and drained repeatedly when she came to us in October, 1916, at which time she had several fistulous tracts.

The following treatments were given:

DATE	RADIANT LIGHT	ACTINIC RAYS		CLINICAL FINDINGS
		Air-cooled Lamp		
1916	Duration of Treatment	Duration of Treatment	Distance from Patient	
Oct. 4	15 min.	3 min.	20 in.	
Oct. 6	10 min.	6 min.	16 in.	Broke adhesions of phalanges.
Oct. 11	10 min.	7 min.	14 in.	Sinuses closing.
Oct. 13	10 min.	3 min.	14 in.	Some swelling.
Oct. 16	10 min.	7 min.	12 in.	Less swelling.
Oct. 18	10 min.	5 min.	12 in.	Opened one sinus.
Oct. 23	10 min.	5 min.	12 in.	Hand improving.
Oct. 25	10 min.	6 min.	12 in.	Very much improved.
Oct. 30	10 min.	5 min.	12 in.	Very much improved.
Nov. 3	10 min.	8 min.	12 in.	Sinuses healed.
Nov. 10	10 min.	8 min.	12 in.	Swelling nearly gone.
Nov. 17	10 min.	10 min.	12 in.	Case dismissed.

Knee

Case No. 392. Male. Age, 33. Infection on inner side of right knee of several days' standing. When he came to us April 1, 1918, he was limping badly. We lanced the abscess and gave him twenty minutes of radiant light and six minutes of actinic rays with the air-cooled lamp. On April 2d he returned somewhat improved, when we gave him twenty minutes of radiant light and two minutes of actinic rays with the water-cooled lamp. Similar treatments were given on the 3d, 4th, and 5th, when he was discharged. No pain after the second treatment.

INJURY

Elbow

Case No. 25. Male. Age, 12. May 25, 1916, he fell through a broken seat in a theater, lacerating the inner surface of his right elbow on a splinter, making a ragged wound 3 x 5 cm. The tissues were torn so that the ligaments were exposed. He came to us May 26, 1916. The wound was left open and treated with actinic rays from the air-cooled lamp for seven minutes, at a distance of ten inches. Other treatments were given on:

DATE	ACTINIC RAYS		CLINICAL FINDINGS
	Air-cooled Lamp		
1916	Duration of Treatment	Distance from Patient	
May 27	7 min.	8 in.	
May 29	10 min.	6 in.	Improving.
May 31	10 min.	3 in.	Granulations started.
June 2	12 min.	2 in.	
June 5	10 min.	2 in.	No discharge.
June 7	7 min.	2 in.	He was dismissed with full use of his arm.

Hand

Case No. 256. Male. Age, 20. On June 15, 1917, his right index finger was caught in a dish-washing machine, tearing it open from distal phalanx to metatarsal through skin and fascia into muscles and ligaments. The wound was filled with dirt and grease. Under gas anesthesia we drew the skin together in places, after repairing the deeper structures. June 16th it was redressed. June 18th there was considerable swelling and pain and he was given a two-minute actinic-ray treatment with the water-cooled lamp. June 19th it was much the same and the treatment was repeated. On the 21st it was healing nicely. On the 23d the treatment was increased to three minutes. He was discharged on June 26, 1917.

IMPETIGO CONTAGIOSO

Case No. 39 C. Female. Age, 7. Came to us suffering from impetigo contagioso. Her first treatment with actinic rays was September 4, 1916, and was of three minutes' duration, at a distance of four inches, using the air-cooled lamp. September 9th she had four minutes, same distance, and on the 16th it was nearly healed and was the last treatment needed.

LUPUS ERYTHEMATOSIS

Case No. 408. Female. Age, 55. Sixteen years ago lupus erythematosis started on her face and had spread backward to the occipital region. There were also large areas over the front and back of the chest. It itched constantly and the scabs in the posterior auricular regions were very heavy and matted together.

She had tried numerous treatments without any relief of the condition. She came to us February 11, 1918, at which time we started actinic-ray treatments.

DATE	ACTINIC RAYS		CLINICAL FINDINGS
	Water-cooled Lamp		
1918	Duration of Treatment	Distance from Patient	
Feb. 11	2 min.	2 in.	
Feb. 18	3 min.	2 in.	Improving.
Feb. 25	4 min.	2 in.	Very much improved.
Mar. 11	2 min.	2 in.	Very much improved.
Mar. 25	3 min.	2 in.	Back very much improved.
April 1	1 min.	2 in.	Chest nearly well.
April 15	1 min.	2 in.	Face smooth except chin.
April 29	5 min.	2 in.	Face smooth.
May 27	4 min.	2 in.	
June 17	4 min.	2 in.	
July 10	3 min.	2 in.	Slight papules in scattered areas. Case all but well.
July 24	5 min.	2 in.	
Oct. 4	......	....	All areas healed.

LYMPHANGITIS

Case No. 274. Male. Age, 35. Restaurant chef. Skinned his right shin on an oven door on July 30, 1917. August 1st he came to our office at noon with his right leg swollen and edematous to the knee; two red streaks an inch wide extended upward to the groin; inguinal glands swollen. He was chilly; his temperature was 103°; pulse 120; his eyes heavy.

We gave him a twenty-minute treatment of radiant light and five minutes of actinic rays with the air-cooled lamp and sent him back to oversee his department (What would you have done?), telling him to report to us at 6 P. M., which he did. His general condition had slightly improved. Repeated the treatment, with instructions to return at 10 A. M. the next day, at which time he was feeling much better—so much so that he was able to oversee his department all day and returned at 6 P. M. (thirty hours after the first treatment) without limping and without pain or soreness except about the abraided skin, which was still swollen; but the red streaks had disappeared and, though still enlarged, the inguinal glands were not sore to palpation.

On July 6, 1917, six days after the first treatment, all evidence of his lymphangitis had disappeared except the abraided skin, which took a few days longer to heal. The only time lost from his work was the amount he took for his treatments. Could you have done as well with any other method?

Details of the treatments are as follows:

DATE	RADIANT LIGHT	ACTINIC RAYS		CLINICAL FINDINGS
		Air-cooled Lamp		
1917	Duration of Treatment	Duration of Treatment	Distance from Patient	
Aug. 1				
12 M.	20 min.	5 min.	14 in.	Bad.
6 P. M.	20 min.	5 min.	12 in.	No worse.
Aug. 2				
10 A. M.	20 min.	5 min.	10 in.	Improved.
6 P. M.	20 min.	5 min.	10 in.	Much improved. Can walk without pain.
Aug. 3				
10 A. M.	20 min.	5 min.	10 in.	No pain.
7 P. M.	20 min.	6 min.	10 in.	Edema gone.
Aug. 4	10 min.	7 min.	10 in.	Feeling fine.
Aug. 5	15 min.	7 min.	10 in.	Feeling fine.
Aug. 6	15 min.	7 min.	10 in.	
Aug. 7	15 min.	7 min.	10 in.	
Aug. 8	15 min.	7 min.	10 in.	
Aug. 10	15 min.	7 min.	10 in.	
Aug. 13	10 min.	10 min.	10 in.	
Aug. 15	10 min.	10 min.	10 in.	
Aug. 20	10 min.	10 min.	10 in.	
Aug. 24	10 min.	10 min.	10 in.	Wound healed.

NEISSERIAN INFECTION

Case No. 335. Female. Age, 18. History as follows: Eight weeks ago began having pain on urinating, which lasted two weeks. This was followed by a swelling of both sides of the vulva. Examination showed Bartholin gland infection, eroded cervix, and yellow leucorrhea. Smear showed gonococci.

October 8, 1917, gave a six-minute treatment of actinic rays through a vaginal speculum, followed by argyrol, 10 per cent. Next treatment on the 9th. On the 10th a ten-minute treatment was given, followed by a magnesium-sulphate tampon (25 per cent of a saturated solution in glycerine), discontinuing the argyrol. On the 13th there was very little leucorrhea, and a smear on the 19th was negative. Her last treatment was on the 29th, when she appeared to be well. Smear negative.

Case No. 190. Male. Age, 47. Infection six weeks previous to his coming to us, during which time he had lost thirty pounds in weight, and, to use his expression, "I am all in." Discharge coming freely and loaded with gonococci.

Our first treatment with the actinic rays consisted in raying, for two minutes each, the prostate, testicles, upper and lower surface of the penis, and the inguinal glands. Within twelve hours the discharge stopped, but returned the next day. However, within a week the discharge stopped entirely and he was gaining a pound a day in flesh. He had daily treatments for ten days duplicating the first; after ten days, thrice weekly for one month—all at a distance of two inches. A year later there had been no return of the trouble.

Diagnosis: Neisserian infection.

NEURASTHENIA

Case No. 123. Female. Age, 44. History as follows: Coryza January, 1916; later was treated for typhoid fever for several weeks. This case was finally diagnosed as pyosalpinx and operated June 5, 1916, when the right ovary and both tubes were removed, followed by abdominal and vaginal drainage. She remained in the hospital six weeks. She came to us September 25, 1916, a typical postoperative neurasthenic. She was exceedingly nervous; her appetite was poor; digestion worse; bowels fairly regular; no headaches; temperature, 99°; pulse, 76. Blood count at this time showed:

Erythrocytes	3,900,000
Leucocytes	8,100
Hemaglobin	75%
Neutrophiles	62%
Color index	95
Lymphocytes	30%
Eosinophiles	1%
Large mono-nuclears	7%

On November 16th this had risen to:

Erythrocytes	5,400,000
Leucocytes	9,000
Hemoglobin	85%
Neutrophiles	67%
Lymphocytes	25%
Eosinophiles	1%
Large mono-nuclears	4%

Her treatment consisted of from ten to twenty minutes with the radiant light (2000-candlepower), followed by from three to ten minutes with the actinic rays (air-cooled lamp), at a distance of twenty-four to fourteen inches, both over entire torso. Treatments given daily for one week until improvement began and then thrice weekly for one month, after which they were twice weekly for four months, although she had very few symptoms after the first two months. We saw this case recently and she is in splendid health. What the operation could not do, actinic rays did do: restored her to health.

Case No. 121. Female. Age, 42. Came to us August 20, 1917, with symptoms of general breakdown and soreness along entire spine.

Actinic-ray treatments were given as follows:

DATE	RADIANT LIGHT	ACTINIC RAYS Air-cooled Lamp		CLINICAL FINDINGS
1917	Duration of Treatment	Duration of Treatment	Distance from Patient	
Aug. 20	10 min.	3 min.	20 in.	
Aug. 22	10 min.	4 min.	18 in.	Some improvement.
Aug. 24	10 min.	3 min.	18 in.	Much improvement.
Aug. 27	10 min.	4 min.	16 in.	Much improvement.
Oct. 13	10 min.	4 min.	16 in.	Pain worse for twenty-four hours.
Oct. 20	10 min.	4 min.	14 in.	Very much improved.
Oct. 29	20 min.	5 min.	14 in.	
Nov. 9	10 min.	8 min.	14 in.	Feeling fine.

Diagnosis: Neurasthenia.

NEPHRITIS

Case No. 125. Male. Age, 36. Came to us January 11, 1917, complaining of nosebleed, dyspnœa, headache, dizziness, and impotency. His blood-pressure reading was: dyastolic, 160; systolic, 280. Pulse, 100. Urinary analysis showed 3 per cent of albumin and a few casts.

His actinic-ray treatments were as follows:

DATE	ACTINIC RAYS Air-cooled Lamp		AUTOCON-DENSATION	CLINICAL FINDINGS
1917	Duration of Treatment	Distance from Patient		
Jan. 11	2 min.	20 in.	10	Bad.
Jan. 12	3 min.	18 in.	10	
Jan. 13	3 min.	16 in.	10	
Jan. 15	6 min.	14 in.	10	B. P., 135-200. Albumin, 4%; casts, few.
Jan. 17	....	.....	10	Less headache.
Jan. 20	7 min.	14 in.	12	Feeling improved. B. P., 140-200.
Jan. 23	8 min.	12 in.	12	Much improved. B. P., 125-185.
Jan. 29	10 min.	12 in.	12	Much improved.
Feb. 8	10 min.	12 in.	12	No headache; no dizzy spells.
Feb. 20	10 min.	12 in.	12	B. P., 125-185. No casts. Doing nicely.

This case was last seen in May, 1918, and had been well since his last treatment on March 9, 1917.

Case No. 16. Male. Age, 42. Came to us October 5, 1916. Two months before this, after drinking beer, he had bloated severely and remained so for several days. His urinary analysis showed albumin 8 per cent and a large number of casts present. Blood pressure: dyastolic, 90; systolic, 145. He was put on a diet of milk and fresh vegetables and was given the following actinic-ray treatments:

DATE	ACTINIC RAYS		AUTOCONDENSATION	CLINICAL FINDINGS
	Air-cooled Lamp			
1916	Duration of Treatment	Distance from Patient		
Oct. 5	3 min.	20 in.	10	Albumin, 8%. Casts present.
Oct. 6	3 min.	16 in.	10	
Oct. 7	5 min.	14 in.	10	Albumin, 10%. Casts present.
Oct. 9	5 min.	12 in.	10	Improved.
Oct. 11	7 min.	12 in.	10	
Oct. 13	10 min.	12 in.	10	Albumin, 2%. Casts present.
Oct. 16	10 min.	12 in.	10	B. P., 85-130.
Oct. 18	10 min.	12 in.	10	Albumin, 5%. Casts, few.
Nov. 20	6 min.	12 in.	10	
Dec. 2	10 min.	12 in.	10	Albumin, 2%. Casts negative. B. P., 90-130. Feeling fine.

Letter March 8, 1917, stated he was in splendid condition.

Diagnosis: Nephritis.

OSTEOMYELITIS

Femur

Case No. 007. Male. Age, 12. Pain started in right knee in October, 1916, and was treated for several months by a Christian Scientist, who diagnosed it rheumatism. He was taken to the West Suburban Hospital on January 15, 1917, where the knee was opened and several pints of pus removed.

When he came to us there were two openings, one in the upper third of the thigh, the lower one just above the knee; drainage tube in each opening. The case was one of osteomyelitis with necrosis of the entire shaft of the femur.

His actinic-ray treatments were as follows:

DATE	ACTINIC RAYS		WEIGHT	CLINICAL FINDINGS
	Air-cooled Lamp			
1917	Duration of Treatment	Distance from Patient		
April 21	2 min.	24 in.	60 lbs.	
April 22	3 min.	20 in.	......	
April 23	6 min.	16 in.	......	Feels better and sleeps better.
April 24	7 min.	14 in.	......	Pus more serous.
April 26	9 min.	12 in.	......	
April 29	10 min.	12 in.	61 lbs.	Tube broken and lost in cavity.
May 1	12 min.	12 in.	......	Tube removed under gas anesthesia.
May 4	12 min.	12 in.	......	Discharge increased from manipulation.
May 6	14 min.	12 in.	62 lbs.	Feeling fine; discharge less.
May 9	15 min.	12 in.	......	
May 12	15 min.	12 in.	......	Feeling very much improved in every way.
May 14	15 min.	12 in.	......	
May 17	15 min.	12 in.	65 lbs.	
May 21	15 min.	12 in.	66 lbs.	

While returning home on the 21st, he slipped on his crutch on the wet pavement and fell, striking on the patella, which fractured the new growth of bone at about the junction of the middle with the lower third. He was taken to the University Hospital on the 29th, where the entire femur and a small sequestrum of the old bone were removed, showing the entire destruction of the femur and its replacement with new bone cells. But for the fracture, this case would have been cured with the actinic rays and removal of the small remaining sequestrum.

He did not rally from the shock of the operation and died six hours later.

It would be impossible to find a more serious case of osteomyelitis than the one just described, and yet in about four weeks he had gained six pounds in weight and was feeling better in every way. His pains disappeared after the fourth treatment and he slept all night from this time on, although previous to taking treatment his mother had been up with him six or eight times each night, rubbing and packing the limb in hot-water bottles to stop pain.

While giving actinic-ray treatments we stopped all irrigation as well as all other treatment.

Humerus

Case No. 022. Female. Age, 4½. Four weeks ago (September, 1916) complained of pain in upper right arm and shoulder, followed within two days by swelling to twice normal size.

This case was treated as a rheumatic case for two weeks, when she was sent to Chicago Union Hospital, by Dr. Berent Hendrickson, Chicago, who took an X-ray, which showed the upper third of the humerus honeycombed with an osteomyelitis following which the arm was opened and drained. Five days later she was referred to us by Dr. Hendrickson for actinic-ray treatments, which were as follows:

DATE	ACTINIC RAYS				CLINICAL FINDINGS
	Duration of Treatment		Distance from Patient		
1916	Air-cooled Lamp	Water-cooled Lamp	Air-cooled Lamp	Water-cooled Lamp	
Oct. 17	2 min.	1½ min.	30 in.	1 in.	
Oct. 18	5 min.	2 min.	24 in.	2 in.	Less pain.
Oct. 19	6 min.	1 min.	20 in.	1 in.	
Oct. 21	6 min.	3 min.	16 in.	1 in.	Can move arm.
Oct. 23	7 min.	3 min.	14 in.	1 in.	Swelling almost gone.
Oct. 25	8 min.	3 min.	14 in.	1 in.	
Oct. 28	8 min.	3 min.	14 in.	1 in.	
Oct. 30	8 min.	3 min.	14 in.	1 in.	
Nov. 1	9 min.	3 min.	14 in.	1 in.	Very little discharge; one drainage opening closed and the other discharging but a few drops of serum. No pus discernible with microscopic slide.

November 18th the case was nearly well and on the 29th she was playing about as usual and using the arm. In November, 1917, Dr. Hendrickson reported that she had had no further trouble and that the arm was in normal condition.

Diagnosis: Osteomyelitis.

Humerus and Tibia

Case No. 550. Male. Age, 35. Referred by Dr. George V. Wyland, Chicago. Came to us December 2, 1918, with the following history: Osteomyelitis of left leg when twelve years old, which was operated and a part of the tibia removed. This spot was reoperated four years ago. When thirteen years of age left humerus began to pain and it was treated for rheumatism, which continued until seven years ago, when it was operated. This wound healed after four weeks but has broken open with considerable discharge about once every year since the operation. During the past month the pain has been continuous and so severe as to be almost unbearable. There is no swelling or redness. X-ray shows slight honeycombing of medullary cavity. He was urged to have it reoperated but refused.

We began actinic-ray treatments at once, as follows:

DATE	RADIANT LIGHT	ACTINIC RAYS		CLINICAL FINDINGS
		Water-cooled Lamp		
1918	Duration of Treatment	Duration of Treatment	Distance from Patient	
Dec. 2	20 min.	3 min.	1 in.	Severe pain.
Dec. 3	20 min.	10 min.	Contact	No relief of pain.
Dec. 4	30 min.	20 min.	Contact	No relief of pain.
Dec. 5	30 min.	30 min.	Contact	Some relief.
Dec. 6	30 min.	30 min.	Contact	Much relief.
Dec. 7	30 min.	5 min.	Contact	Much relief but badly blistered.
Dec. 9	20 min.	6 min.	Contact	No pain for two days.
Dec. 12	20 min.	10 min.	Contact	Slight pain for a few hours.
Dec. 16	20 min.	10 min.	Contact	No pain.
Dec. 23	20 min.	10 min.	Contact	Slight pain.
Dec. 30	25 min.	6 min.	Contact	Almost free from pain since last treatment.

OSTEITIS FIBROSA

Case No. 509. Female. Age, 18. Eight years ago she had a compound fracture of both radius and ulna at the junction of upper and middle third. For the past five years it has pained constantly. One year ago it was operated, with one month's relief; since then pain has been more intense. The X-ray picture immediately following shows an apparent osteitis fibrosa.

The following actinic-ray treatments were given:

DATE	RADIANT LIGHT	ACTINIC RAYS		CLINICAL FINDINGS
		Water-cooled Lamp		
1918	Duration of Treatment	Duration of Treatment	Distance from Patient	
Sept. 21	10 min.	1 min.	Contact	
Sept. 23	20 min.	1 min.	Contact	Steady pain.
Sept. 24	20 min.	3 min.	Contact	
Sept. 25	20 min.	4 min.	Contact	Less pain.
Sept. 26	20 min.	5 min.	Contact	Blistered.
Sept. 28	20 min.	1 min.	Contact	
Sept. 29	20 min.	2 min.	Contact	No pain for one day.
Sept. 30	20 min.	2 min.	Contact	
Oct. 2	10 min.	....	....	Slight pain.
Oct. 4	15 min.	2½ min.	Contact	No pain for two days.
Oct. 7	15 min.	5 min.	Contact	Pain worse.
Oct. 9	15 min.	2 min.	Contact	Pain severe. Blistered.
Oct. 11	15 min.	3 min.	Contact	Much improved.
Oct. 14	15 min.	5 min.	Contact	Very little pain.
Oct. 17	15 min.	9 min.	Contact	No pain.
Oct. 21	15 min.	5 min.	Contact	No pain for four days.
Oct. 28	15 min.	6 min.	Contact	No pain for eleven days.
Nov. 18	15 min.	10 min.	Contact	No pain since last treatment.
Nov. 25	15 min.	4 min.	Contact	Slight pain.
Dec. 12	15 min.	10 min.	Contact	Very little pain since last treatment.

OVARITIS

Case No. 243. Female. Age, 27. Came to us May 13, 1917, complaining of a sore spot inside the vagina which had been growing worse for the past three months. Examination showed a prolapsed, painful left ovary.

She was given a five-minute actinic-ray treatment with a water-cooled lamp, through a vaginal speculum, using a medium-sized Sharp applicator. On the 14th a seven-minute treatment was given. Other treatments from eight to twelve minutes were given on the 15th, 16th, 18th, 21st, 24th, and 28th of the same month, making a total of eight treatments. The pain improved markedly after the third treatment, and after the fifth it disappeared and has not returned.

Case No. 378. Female. Age, 32. Has had pain in the left ovarian region for a number of years and had been told recently that it would be necessary to have the ovary removed, as it was enlarged and cystic. The pain was severe enough to prevent her from following her usual employment, which was office work.

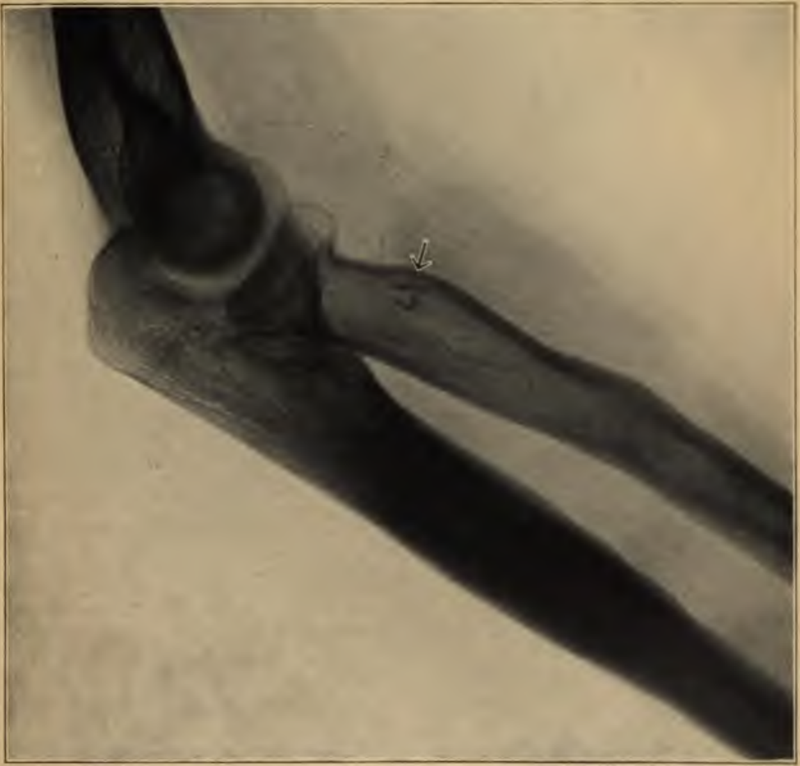
Her actinic-ray treatments, given through a vaginal speculum, were:

DATE	ACTINIC RAYS	CLINICAL FINDINGS
1918	Water-cooled Lamp	
	Duration of Treatment	
Jan. 2	10 min.	
Jan. 4	10 min.	
Jan. 7	10 min.	
Jan. 9	10 min.	
Jan. 14	10 min.	Less pain.
Jan. 23	10 min.	No pain at all.
Feb. 5	10 min.	No pain.
Feb. 9	10 min.	Slight pain.
Feb. 11	10 min.	Flowing.
Feb. 23	10 min.	No pain.
Mar. 2	10 min.	No pain.
Mar. 6	10 min.	No pain.
Mar. 10	10 min.	No pain.

As there had been no pain for some time except a slight discomfort when flowing, treatments were discontinued. In February, 1919, she reported that she was still in splendid condition, and an operation had so far been avoided.

Diagnosis: Ovaritis.

Case No. 509—Osteitis Fibrosa



Arrow shows diseased area near proximal end of radius.

Plate XII

PERIOSTITIS

Result of Injury

Case No. 356. Male. Age, 63. One year ago a plank was dropped on his right foot, which kept him at home for five weeks. He came to us October 30, 1917, unable to work because of pain. We had an X-ray taken, which showed a former fracture of the first metatarsal of the right foot. We had him wear Ground Gripper shoes and began actinic-ray treatments.

DATE	RADIANT LIGHT	ACTINIC RAYS		CLINICAL FINDINGS
		Air-cooled Lamp		
1917	Duration of Treatment	Duration of Treatment	Distance from Patient	
Oct. 30	25 min.	1 min.	12 in.	Painful.
Oct. 31	25 min.	2 min.	10 in.	Less painful.
Nov. 2	25 min.	4 min.	10 in.	Less painful.
Nov. 5	25 min.	5 min.	10 in.	Much improved.
Nov. 7	25 min.	5 min.	10 in.	Much improved.
Nov. 14	20 min.	6 min.	10 in.	Improved.
Nov. 21	20 min.	7 min.	10 in.	No pain.
Nov. 26	20 min.	8 min.	10 in.	No pain or soreness.

The patient was told to report if there was any pain. He reported several weeks later that he had had no further trouble and in August, 1918, was still free from pain.

PHARYNGITIS AND LARYNGITIS

Case No. 267B. Female. Age, 26. April 19, 1918, came to us suffering from a severe pharyngitis and laryngitis.

The following actinic-ray treatments were given:

DATE	RADIANT LIGHT	ACTINIC RAYS				CLINICAL FINDINGS
		Duration of Treatment		Distance from Patient		
1918	Duration of Treatment	Air-cooled Lamp	Water-cooled Lamp	Air-cooled Lamp	Water-cooled Lamp	
April 19	15 min.	10 min.	......	24 in.	....	General pain.
April 20	15 min.	....	2 min.	......	1 in.	Improved; less pain.
April 21	15 min.	10 min.	2 min.	24 in.	1 in.	Much improvement.
April 22	15 min.	10 min.	......	20 in.	....	Much improvement.
April 24	10 min.	10 min.	......	18 in.	....	Dismissed.

PRURITIS

Ani

Case No. 351. Female. Age, 59. Referred by Dr. M. B. Blouke, Chicago. Came to us October 24, 1917, itching about anus, which began in May, 1917, and had grown steadily worse until it was almost unbearable. There was some vaginal leucorrhea.

Actinic-ray treatments as follows—vaginal treatment through speculum:

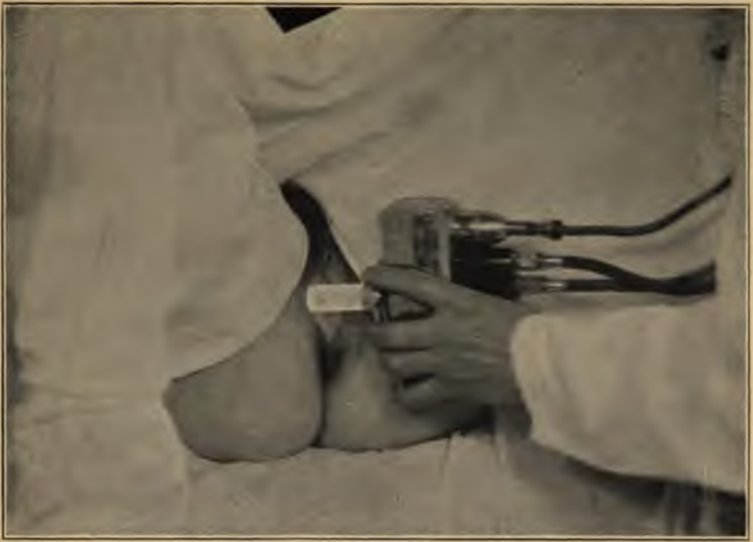
DATE	ACTINIC RAYS			CLINICAL FINDINGS
	Duration of Treatment		Distance from Patient	
	Water-cooled Lamp			
1917	Skin	Vagina		
Oct. 24	2 min.	......	2 in.	
Oct. 27	2 min.	6 min.	2 in.	Relief.
Oct. 30	2 min.	7 min.	2 in.	Less discharge.
Nov. 1	2 min.	9 min.	2 in.	Less discharge.
Nov. 5	2 min.	9 min.	2 in.	Less discharge.
Nov. 7	3 min.	9 min.	2 in.	Less discharge.
Nov. 9	3 min.	......	2 in.	No discharge.
Nov. 26	3 min.	......	2 in.	Very little itching. Dismissed.

Vulvæ

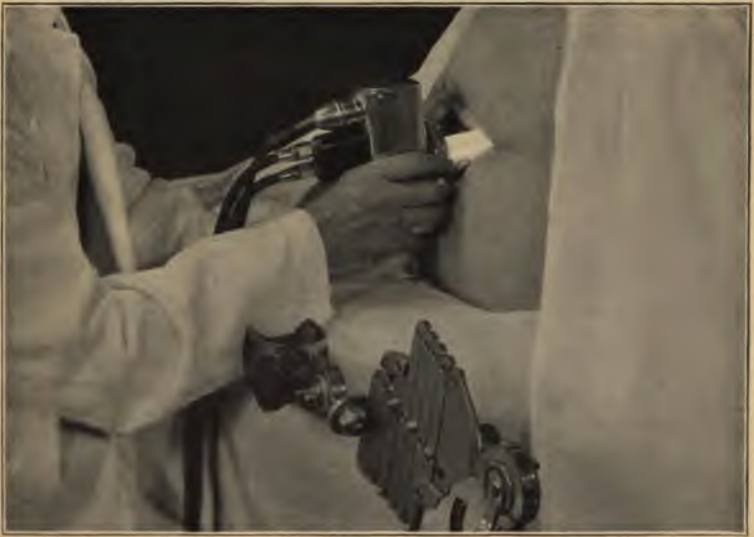
Case No. 299. Female. Age, 35. Referred by Dr. B. A. McBurney, Pamona, Cal. Had a pruritis vulvæ of two years' standing which had grown rapidly worse during the past six months; slight abrasions of skin over pubes and labium majus from scratching.

A one-and-one-half-minute treatment gave complete relief for one night; a second treatment of two minutes gave some relief; while the third treatment of four minutes, though it blistered badly, gave almost complete relief from the itching. The water-cooled lamp was used in this case. Slight itching has returned at times, but a mild non-blistering raying readily controlled it. No other treatment internally or externally was used.

Actinic-ray treatments:

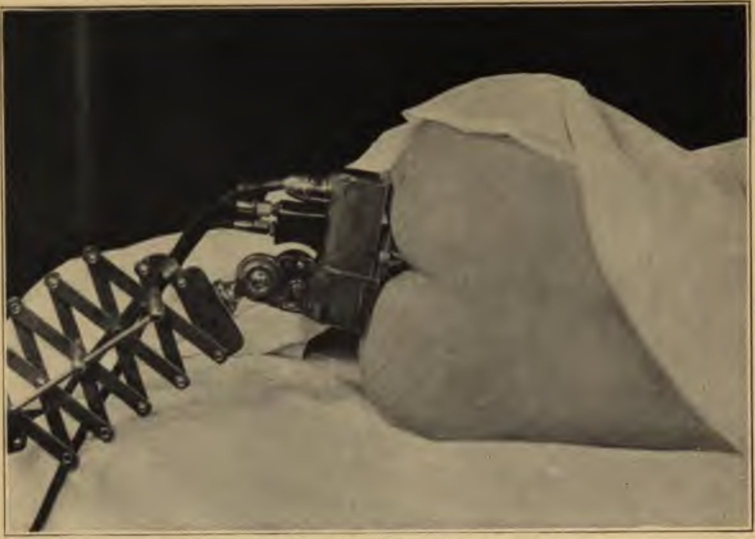


Treatment for Bartholin abscess.

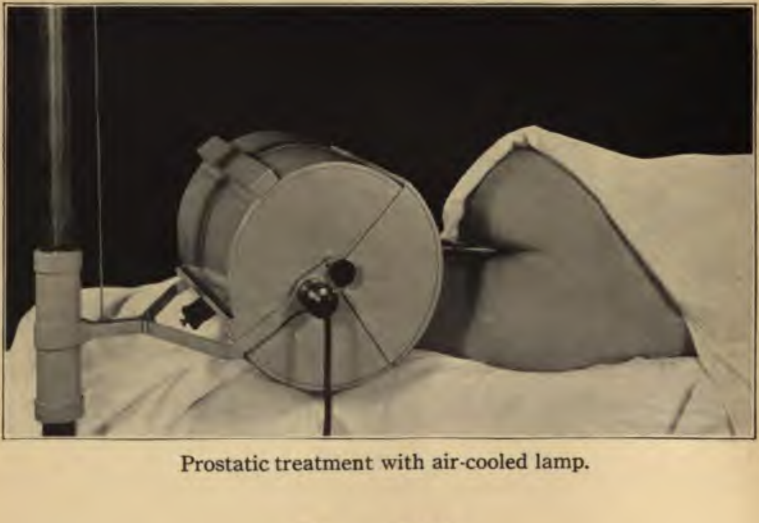


Local treatment for external hemorrhoids.

Plate XIII



Prostatic treatment with water-cooled lamp.



Prostatic treatment with air-cooled lamp.

Plate XIV

DATE	ACTINIC RAYS		CLINICAL FINDINGS
	Water-cooled Lamp		
1917	Duration of Treatment	Distance from Patient	
Aug. 18	1½ min.	4 in.	
Aug. 20	2 min.	2 in.	Less itching.
Aug. 23	4 min.	3 in.	
Oct. 5	2 min.	4 in.	Badly blistered.
Oct. 17	2 min.	4 in.	Much improvement.
Oct. 24	4 min.	4 in.	
Nov. 9	5 min.	4 in.	
Nov. 20	4 min.	4 in.	Slight itching.

PROSTATITIS

Chronic

Case No. 0100. Male. Age, 57. His bladder control had grown so bad that when Nature called he would lose a part of its contents before he could get into the adjoining room. He was up every hour of the night.

Actinic rays were begun in October, 1917, and continued, as follows:

DATE	ACTINIC RAYS	PROSTATE MASSAGE	CLINICAL FINDINGS
	Water-cooled Lamp		
1917	Duration of Treatment	Duration of Treatment	
Oct. 12	10 min.	4 min.	Slight control.
Oct. 13	6 min.	2 min.	
Oct. 19	10 min.	2 min.	
Oct. 24	10 min.	3 min.	Better control.
Oct. 26	10 min.	3 min.	
Oct. 30	10 min.	3 min.	
Nov. 5	10 min.	3 min.	
Nov. 9	10 min.	3 min.	
Nov. 15	10 min.	3 min.	Control for two hours.
Nov. 28	10 min.	3 min.	Improved. Three times at night.
Dec. 10	10 min.	3 min.	Bladder held eight ounces.
Dec. 21	10 min.	3 min.	Can go for four hours. Bladder held ten ounces.
1918			
Jan. 8	10 min.	3 min.	Bladder control nearly normal.

Chronic, with Vesiculitis

Case No. 0101. Male. Age, 45. Had had prostatic irritation for twenty years, which had kept him irritable and interfered with proper rest at night.

Actinic-ray treatments, through our special proctoscope, as stated below:

DATE	ACTINIC RAYS	PROSTATE MASSAGE	CLINICAL FINDINGS
	Water-cooled Lamp		
1917	Duration of Treatment	Duration of Treatment	
June 10	4 min.	2 min.	
June 12	5 min.	3 min.	No improvement.
June 14	7 min.	4 min.	Less nervous.
June 16	7 min.	4 min.	
July 5	8 min.	4 min.	Much improved.
July 10	8 min.	4 min.	Sleeping improved.
July 16	8 min.	4 min.	
July 26	10 min.	4 min.	
Aug. 6	10 min.	4 min.	One bad night.
Aug. 21	10 min.	4 min.	Feeling better.
Aug. 28	10 min.	4 min.	Sleeping splendidly.
Sept. 5	10 min.	4 min.	Very much improved.
Sept. 18	10 min.	4 min.	Feeling fine.
Sept. 28	10 min.	4 min.	Feeling fine.

Hypertrophic

Case No. 52A. Male. Age, 57. Has had trouble controlling his urine for some months and lately has had to urinate from five to seven times each night. Began actinic-ray treatments for this condition in April, 1916, using special proctoscopic applicator.

DATE	ACTINIC RAYS	PROSTATE MASSAGE	CLINICAL FINDINGS
1916	Water-cooled Lamp Duration of Treatment	Duration of Treatment	
April 9	4 min.	3 min.	
April 12	5 min.	3 min.	Somewhat improved.
April 16	5 min.	4 min.	
April 19	6 min.	4 min.	Prostate smaller.
April 30	7 min.	4 min.	Urinated four times during night.
May 2	5 min.	4 min.	
May 14	7 min.	4 min.	
May 28	7 min.	4 min.	Doing nicely.
June 4	8 min.	4 min.	Doing nicely.
June 15	8 min.	4 min.	Usually urinates twice during night.
July 7	8 min.	4 min.	Can go all night at times.
Aug. 10	10 min.	4 min.	Urine comes much more freely.

PSORIASIS

Case No. 390. Male. Age, 20. Referred by Dr. M. B. Blouke, Chicago. Had had an eruption on his legs, arms, body, and head for more than seven years. The scales were dry, and there was considerable itching at times. Plainly a case of psoriasis.

The following are the actinic-ray treatments he received:

DATE	ACTINIC RAYS		CLINICAL FINDINGS
	Air-cooled Lamp		
1918	Duration of Treatment	Distance from Patient	
Jan. 24	3 min.	15 in.	
Jan. 26	7 min.	12 in.	
Jan. 29	10 min.	10 in.	Spots smaller.
Feb. 1	10 min.	10 in.	No oozing.
Feb. 9	10 min.	10 in.	Decided improvement.
Feb. 28	12 min.	10 in.	Improving.
Mar. 7	12 min.	10 in.	Spots continually growing smaller.
Mar. 23	12 min.	10 in.	
April 13	12 min.	10 in.	Very much improved.
April 27	10 min.	10 in.	
May 4	10 min.	10 in.	
June 6	10 min.	10 in.	
June 16	10 min.	10 in.	
July 13	10 min.	10 in.	
July 29	10 min.	10 in.	Spots all disappeared. Dismissed as arrested case. Later reports will determine period of arrestment.

PYOSALPINX

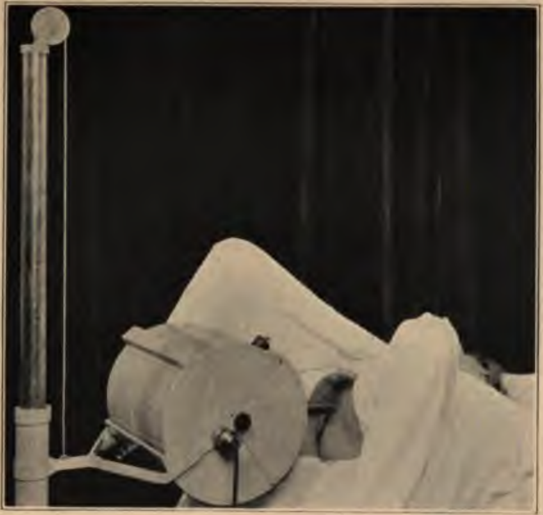
Case No. 191. Female. Age, 26. Came to us February 15, 1917, with a history of exposure December, 1916, and burning on urinating ever since. She now had pain in both ovarian regions, with a sense of weight throughout the pelvis. We gave her the following treatments:

DATE	ACTINIC RAYS Water-cooled Lamp		CLINICAL FINDINGS
1917	Duration of Treatment	Distance from Patient	
Feb. 15	10 min.	2 in.	Considerable pain.
Feb. 16	12 min.	2 in.	Discharge yellow.
Feb. 22	12 min.	2 in.	Has been flowing; less pain.
Feb. 28	10 min.	2 in.	No pain.
Mar. 2	10 min.	2 in.	
Mar. 9	10 min.	2 in.	Discharge white.
Mar. 14	10 min.	2 in.	No pain; slight discharge.
Mar. 17	12 min.	2 in.	No pain or soreness.
Mar. 28	12 min.	2 in.	Very much improved.

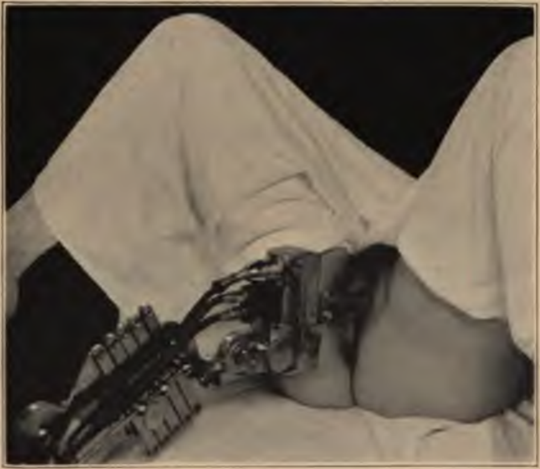
PYONEPHROSIS

Case No. 221. Female. Age 45. Referred by Dr. ...., Chicago. One year ago she had had rheumatism and endocarditis, following which she developed pyonephrosis. The bacilli found in the urine were mostly colonic, with some streptococci and staphylococci. Her temperature ranged from 99° to 101° until September 1, 1916. Since that time she had had weekly injections of antiseptics into the kidney through a ureteral catheter and had improved slightly. She still had considerable pus and many bacteria in the urine when she came to us April 21, 1917, feeling, as she described it, "All in," and unable to follow her usual vocation.

We gave her the following actinic-ray treatments:



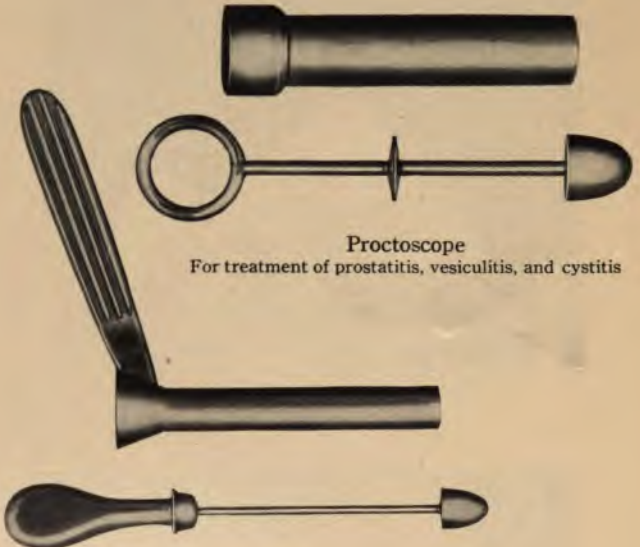
Pelvic treatment with air-cooled lamp.



Pelvic treatment with water-cooled lamp.

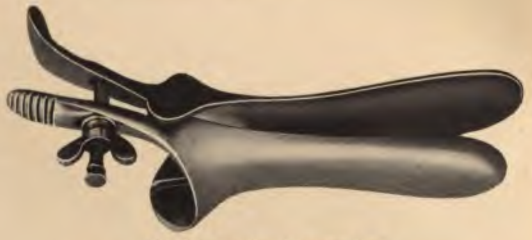
Plate XV

Specula



Proctoscope
For treatment of prostatitis, vesiculitis, and cystitis

Cystoscope
For treatment of urethritis



Fitch's vaginal speculum
For treatment of vaginitis, cystitis, and urethritis

Plate XVI

DATE	ACTINIC RAYS		CLINICAL FINDINGS
	Air-cooled Lamp		
1917	Duration of Treatment	Distance from Patient	
April 21	2 min.	20 in.	
April 22	4 min.	16 in.	
April 23	4 min.	14 in.	Less tired.
April 26	9 min.	12 in.	Feeling fine and works without tiring.
April 28	12 min.	12 in.	Steadily improving.
May 2	15 min.	12 in.	Urine cloudy.
May 16	15 min.	12 in.	Caught cold.
May 25	15 min.	12 in.	Feeling fine. Going to country for vacation.

This case was not seen again until May 6, 1918, when she reported that she had had a good year, and had been able to continue her work uninterruptedly.

RHINITIS

Atrophic

Case No. 21. Male. Age, 28. Crusts had been forming daily in nostril for past three years. Tonsils hypertrophied and contained caseous masses.

Treatments:

DATE	ACTINIC RAYS		CLINICAL FINDINGS
	Water-cooled Lamp		
1917	Duration of Treatment	Distance from Patient	
Jan. 10	2 min.	½ in.	
Jan. 11	2 min.	½ in.	Breathes more freely.
Jan. 13	2 min.	½ in.	Less crusts.
Jan. 15	2 min.	½ in.	
Jan. 17	2 min.	½ in.	Bloody discharge from nose.
Jan. 20	......	.....	Removed tonsils complete.
Jan. 26	......	.....	Throat in good condition.
Feb. 6	2 min.	½ in.	Breathing freely.
Feb. 9	3 min.	½ in.	Breathing freely.
Feb. 12	5 min.	½ in.	Breathing freely.
Mar. 3	4 min.	½ in.	Breathing freely.
Mar. 17	4 min.	½ in.	Dismissed.

SCIATICA

Case No. 466. Male. Age, 40. Six months ago, after a long hike and a cold shower bath, he contracted sciatica. After spending much time in hospitals and having his tonsils removed, with but little benefit, if any, he came to us for actinic-ray treatments, which were as follows:

DATE	RADIANT LIGHT		ACTINIC RAYS		CLINICAL FINDINGS
	Duration of Treatment		Air-cooled Lamp		
1918	General	Sinus	Duration of Treatment	Distance from Patient	
May 18	15 min.	15 min.	3 min.	20 in.	Could scarcely walk.
May 20	10 min.	15 min.	4 min.	16 in.	Improved. Walks more easily.
May 21	10 min.	20 min.	5 min.	14 in.	Much improved.
May 22	10 min.	20 min.	5 min.	12 in.	Much improved.
May 31	10 min.	20 min.	5 min.	12 in.	Can move freely without pain.
June 4	....	20 min.	5 min.	10 in.	Doing considerable work.
June 7	....	20 min.	5 min.	10 in.	Going about as usual.
June 10	....	20 min.	5 min.	10 in.	
June 14	....	20 min.	5 min.	10 in.	Well enough to travel.

(Under "Radiant Light," "General" means entire body radiation for general effect, while "Sinus" means face radiation for sinus infection.)

SINUS INFECTION

Case No. 264. Male. Age, 30. Gave the following history when he came to us on July 6, 1917: Four years ago he began to have a dull pain in supraorbital region, which came on periodically, lasting from a half-hour to a week; but for the past year it had been almost constant, with, at times, a greenish-yellow discharge from the nose. He had taken treatment from a number of doctors, but with very little relief.

On July 6th we gave him a forty-minute treatment with the radiant light and five minutes of actinic rays, with the air-cooled lamp, at a distance of twenty-four inches, with some relief of pain before he left the office. The following day there was very little soreness and no pain. The treatment was duplicated, with complete relief of all symptoms. Other treatments were on July 9th, 11th, and 12th, of the same duration and distance. August 27, 1917, he reported that he had had no return of the trouble.

Case No. 301. Male. Age, 59. Referred by Dr. LeRoy Thompson, Chicago. Has had trouble with his nose and sinuses for the past three years. One month ago he had the right inferior turbinate removed at St. Luke's Hospital, Chicago. Two weeks later he had a second operation at the same hospital, neither operation giving relief. Because of the pain, he had been unable to sleep on the right side of his face for the past month.

Actinic-ray treatments were given as follows, using a solid-quartz applicator:

DATE	RADIANT LIGHT	ACTINIC RAYS		CLINICAL FINDINGS
		Water-cooled Lamp		
1917	Duration of Treatment	Duration of Treatment	Location of Applicator	
Sept. 14	30 min.	3 min.	In nose	Immediate relief. Slept on right side of face.
Sept. 15	30 min.	2 min.	In nose	
Sept. 17	30 min.	2 min.	In nose	Discharge freer.
Sept. 19	30 min.	3 min.	In nose	Very much improved.
Sept. 21	30 min.	3 min.	In nose	
Sept. 25	30 min.	3 min.	In nose	
Sept. 28	30 min.	3 min.	In nose	No pain.
Oct. 1	30 min.	3 min.	In nose	
Oct. 8	20 min.	3 min.	In nose	Very little discharge.
Oct. 18	20 min.	3 min.	In nose	Dismissed.

Diagnosis: Sinus infection.

SPLENOMEDULLARY LEUKEMIA

Case No. 64. Male. Age, 50. He came to us September 1, 1916, with a history of pain in his legs for some months past. He tired so easily that by 11 A. M. he could scarcely work and was extremely irritable. He had lost thirty-five pounds in weight.

His appearance was the cachexia of one seriously ill, with the apprehension of one who does not expect to get well.

His blood count on September 8, 1916, was:

Erythrocytes	5,100,000
Leucocytes	146,000
Hemoglobin	95%
Myelocytes	20%

On September 26, 1916, the count was:

Erythrocytes	4,000,000
Leucocytes	320,000
Hemoglobin	80%
Myelocytes	34%

On November 20, 1916, the count was:

Erythrocytes	5,260,000
Leucocytes	201,000
Hemoglobin	82%
Myelocytes	17%

On December 23, 1916:

Erythrocytes	5,220,000
Leucocytes	182,000
Hemoglobin	95%
Myelocytes	30%

On April 10, 1917:

Erythrocytes	5,000,000
Leucocytes	175,000
Hemoglobin	90%
Myelocytes	18%

The treatment of this case was begun by giving a two-minute exposure to actinic rays, and the exposure was increased one minute a day until we were giving a ten-minute treatment.

The interval gradually lengthened until he was getting but one treatment a week. When we began treatment he could scarcely walk a block, but he gradually improved until in April, 1917, he could walk seven or eight miles a day. His spleen, when he began treatment, was within 8 cm. of the median line and about 4 cm. below the costal margin. In April, 1917, it was normal in size. In September, 1916, his long bones were extremely sensitive to touch, but in April, 1917, they were not even tender, and, as he expressed it, "I do not know, as far as my sensations are concerned, why I am taking treatments."

In July, 1917, he left Chicago, returning once in two weeks for treatment and observation. In July, 1918, after overworking, he had a relapse, running temperature as high as 103°, and the spleen was enlarged until it filled one-fourth of the abdominal cavity. His skin was very sensitive, but there was no return of the pain in the bones.

He resumed his treatments as follows:

DATE	RADIANT LIGHT	ACTINIC RAYS		CLINICAL FINDINGS
		Air-cooled Lamp		
1918	Duration of Treatment	Duration of Treatment	Distance from Patient	
June 8	....	....	.....	Weight, 163 pounds.
July 6	15 min.	10 min.	10 in.	Not so well.
July 25	15 min.	10 min.	10 in.	Weight, 151.
Aug. 2	15 min.	10 min.	10 in.	Chills and fever.
Aug. 3	15 min.	10 min.	10 in.	T., 103; P., 100.
Aug. 7	15 min.	10 min.	10 in.	T., 98; P., 80; Wt., 145.
Aug. 10	15 min.	10 min.	10 in.	T., 100; P., 90.
Aug. 16	15 min.	10 min.	10 in.	T., 98; P., 80; Wt., 140.
Aug. 26	15 min.	10 min.	10 in.	
Sept. 9	15 min.	10 min.	10 in.	
Sept. 23	10 min.	10 min.	10 in.	Wt., 140.
Oct. 6	....	10 min.	10 in.	Wt., 144. Went to work.
Oct. 14	....	10 min.	10 in.	Working eight hours daily.
Oct. 16	....	10 min.	10 in.	Pain in scapula.
Oct. 27	....	10 min.	10 in.	Very much improved.
Oct. 31	....	10 min.	10 in.	Weighs 146.
Nov. 4	....	10 min.	10 in.	Weighs 148.
Nov. 7	....	10 min.	10 in.	Pain in scapula improved.
Nov. 12	....	10 min.	10 in.	Working steadily.
Nov. 26	....	10 min.	10 in.	Weighs 150.

November 26, 1918, the blood count was:

Erythrocytes	4,462,000
Leucocytes	160,000
Hemoglobin	75%
Myelocytes	18%

SYCOSIS

Case No. 39D. Female. Age, 10. Sycotic patch on occipital portion of scalp about 6 cm. in diameter. First actinic-ray treatment with the water-cooled lamp, at a distance of one inch, for three minutes, was sufficient to destroy the infection.

SYPHILIS

Case No. 273. Male. Age, 37. Came to us July 22, 1917. Ten weeks previous he had noticed a sore on the side of the glans penis. He had a Wasserman examination made at the Presbyterian Hospital, New Orleans, on June 2, 1917. On June 23d the sore had refused to heal; so he had scrapings taken for dark-field examination and another Wasserman made at the same hospital. All reports were negative.

At the time he came to us the sore was of the size of a silver dime, the edges and surface soft, and it had the appearance of chancroid. We gave him three actinic-ray treatments with the water-cooled lamp, which did not start the healing process. We then started giving him sodium cacodylate, and within three days the sore had commenced to heal, proving the diagnosis. On August 11th the sore was entirely healed and his general health greatly improved.

TINEA

Barbæ

Case No. 46. Male. Age, 20. Trichophytinea barbæ of four weeks' duration. Right side of face from lower maxilla to clavicle and beyond median line, both anteriorly and posteriorly,

Applicators

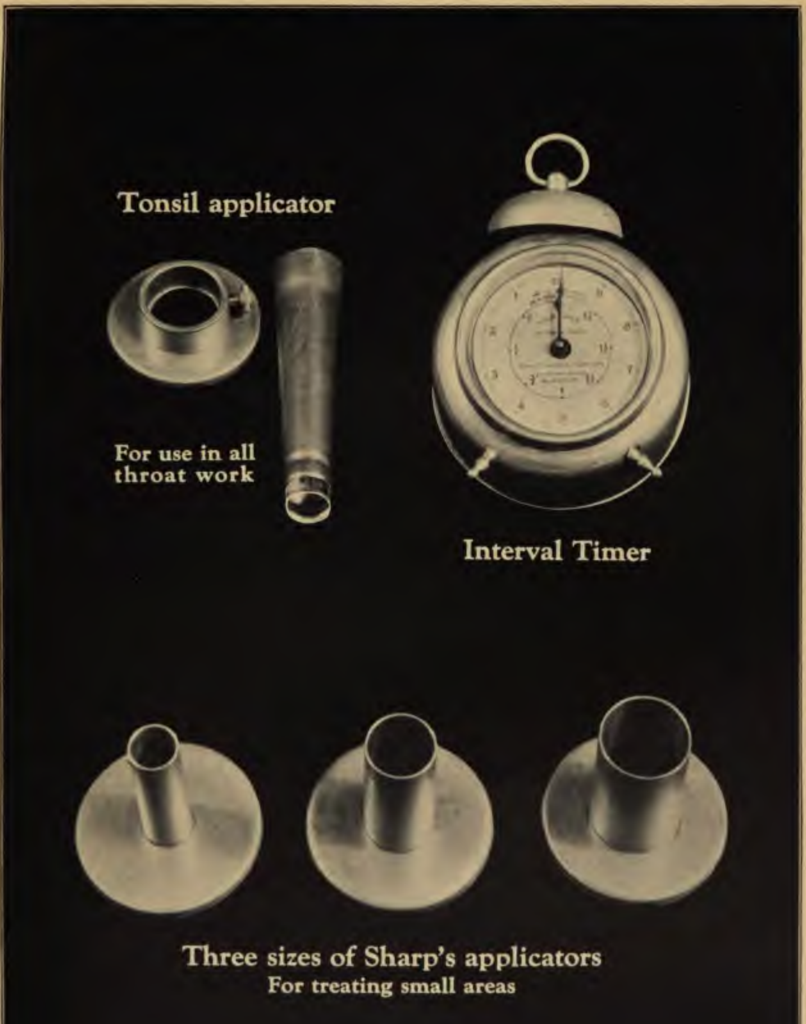
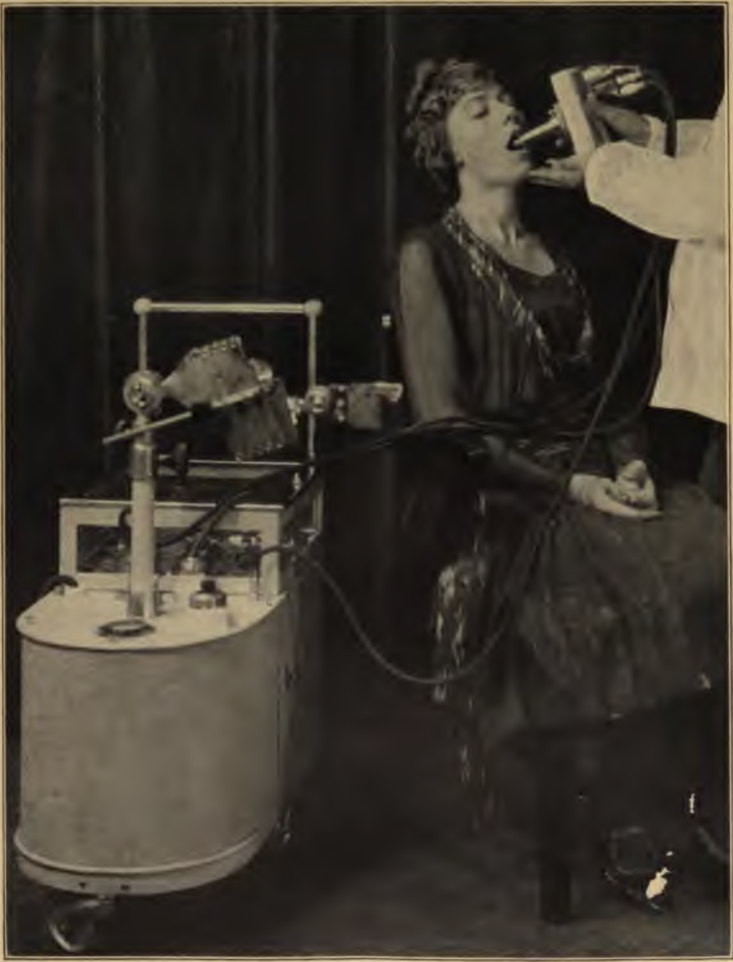

Tonsil applicator
For use in all throat work
Interval Timer
Three sizes of Sharp's applicators
For treating small areas

Plate XVII



Local treatment of tonsils.

Plate XVIII

was a mass of scabs and abscesses. Of the latter we opened six. April 26, 1916, we gave a nine-minute treatment with the air-cooled lamp; April 27th, a ten-minute treatment, when we removed the scabs. It had been spreading a half-inch a day before he came to us. The first treatment stopped the spreading, and at the end of the first twenty-four hours the edges were retracting. April 20th we gave a twelve-minute treatment, and on the 29th one of eighteen minutes. Following this he had six treatments, when he was discharged. No other treatment was used. We saw him in January, 1917, and he had remained well.

Tonsorans

Case No. 39D. Female. Age, 18. Came to us September 4, 1916, with a well-developed case of tinea tonsorans. She was given a three-minute treatment with actinic rays from a water-cooled lamp, at a distance of one inch, which destroyed all evidence of infection. We have seen her frequently and there has been no return of the trouble.

TONSILS

Hypertrophied

Case No. 357. Male. Age, 18. Tonsils chronically enlarged and crypts filled with caseous material. After cleaning out the caseous masses we began actinic-ray treatments, using our special applicator.

DATE	ACTINIC RAYS		CLINICAL FINDINGS
	Water-cooled Lamp		
1917	Duration of Treatment	Distance from Patient	
Oct. 30	3 min.	Contact	Conscious of constant irritation.
Oct. 31	3 min.	Contact	
Nov. 2	3 min.	Contact	Throat feels clearer.
Nov. 9	3 min.	Contact	
Nov. 30	3 min.	Contact	Very much improved.
Dec. 3	4 min.	Contact	Improved.
Dec. 5	4 min.	Contact	
Dec. 12	4 min.	Contact	
Dec. 19	4 min.	Contact	Tonsils well within the pillars and healthy.

Hypertrophied

Case No. 18. Male. Age, 40. He feared having his enlarged tonsils removed because of possible injury to his voice. The right tonsil was so large that it reached to the median line in the throat, and the left was about half this size.

We began treating them with actinic rays on October 6, 1917, using our special applicator.

DATE	ACTINIC RAYS		CLINICAL FINDINGS
	Water-cooled Lamp		
1917	Duration of Treatment	Distance from Patient	
Oct. 6	3 min.	Contact	One tonsil extended to median line.
Oct. 8	3 min.	Contact	Slight irritation.
Oct. 10	3 min.	Contact	Slight irritation.
Oct. 13	3 min.	Contact	Decreasing in size.
Oct. 20	3 min.	Contact	Voice clearer.
Oct. 29	3 min.	Contact	Voice much improved.
Nov. 5	4 min.	Contact	Tonsils much smaller.
Nov. 8	3 min.	Contact	
Nov. 21	3 min.	Contact	
Dec. 6	4 min.	Contact	Voice in splendid condition. Tonsils about level with pillars. Case dismissed.

Hypertrophied

Case No. 010. Male. Age, 50. During September, 1917, a doctor while in our office mentioned the fact that his tonsils had been troubling him for the past two years. The left one, particularly, had interfered with swallowing. To use his expression, "The throat seems full." Examination showed the tonsil protruding between the pillars, and this despite the fact that he had had treatment at various times.

We gave him a two-minute actinic-ray treatment with the water-cooled lamp, using our special applicator, and the next morning the tonsil had receded behind the pillars and he said, "My throat seems open for the first time in two years."

Diagnosis: Hypertrophied tonsils.

TUBERCULOSIS

IN giving you the treatment of tuberculosis with actinic rays we do not expect to give you much that is new; neither do we expect to throw aside those things which are of proved value, such as sunlight, good food, rest, and cleanliness; rather we wish to emphasize these, and in so doing to give particular emphasis to the use of sunlight in a concentrated form. Sunlight is the first essential in the recovery of the tubercular case.

Good food is a close second; but we do wish to enter our protest against the stuffing process which has been in vogue for some time. Stuffing a tubercular patient will upset an already disturbed stomach, and with the stomach disordered there can be but little hope of recovery; hence we do not stuff, but urge the patient to eat all that he can digest properly, and no more. He should eat frequent small meals rather than a few large ones.

All of the oils and fats that can be properly digested should be taken, but no more. Butter-fat is without doubt the best, followed closely by olive oil and bacon. It matters but little how these foods are taken; they may be cooked with other foods or taken separately. A large part of the butter eaten should, however, be taken unheated and spread on whole-wheat or bran bread. Rye bread is only slightly less valuable than whole-wheat or bran. At least a heaping tablespoonful of bran should be eaten daily, either by itself or mixed with other food.

Next in order come the uncooked vegetables, from which we obtain the exceedingly minute but *invaluable vitamins*—which cooking destroys—as in lettuce, Chinese celery, watercress, celery, cucumbers (without salt or vinegar), radishes, tomatoes, onions, carrots, cabbage, melons of all kinds (especially the honeydew), grapes (which are much vaunted as a cure), as well as all non-acid fruits.

Cooked fruits come into the diet of the tubercular along with the cooked vegetables, and chief among these are prunes, peaches, apples, pears, plums. Among the cooked vegetables should be mentioned beets, string beans, carrots, onions, eggplant, Brussels sprouts, squash, pumpkin, parsnips, asparagus, spinach and all greens, sauerkraut, potatoes (with their skins, either boiled or baked). All water in which these vegetables are cooked should be saved to add to other cooking, best of all to soup stock, for in this water is a most valuable food element, the mineral salts, which are extracted in the cooking but not destroyed and when thrown away are wasted. While the mineral salts are in minute quantities when compared to the starches, carbohydrates, and fats, yet it is impossible to remain well or regain good health without them.

Eggs and milk are excellent in most cases but must not be pushed where they disagree. Bulgarian milk will disagree less than sweet milk.

Lastly come the heavy starches and meats. Among the heavy starches are brown rice, whole wheat, beans (lima, navy, etc.), cornmeal, oatmeal, buckwheat, macaroni, spaghetti, dried peas, and bananas. These heavy starches are essential to the upbuilding and upkeeping of the human body, but the tubercular should use them sparingly until his improved digestion will properly care for them. At all times they must be well cooked —*which means hours.* Oatmeal, for instance, should cook steadily for six or eight hours, or until it becomes a jelly. When in this condition the starch is thoroughly converted and even a delicate stomach will digest a fairly large quantity of it.

Meats, except bacon or fried salt pork, should come last in the tubercular's diet, and then in about the following order: wild game, chicken, mutton, beef, veal, pork (other than salt pork and bacon). While cheese ranks about on a par with pork in the tubercular's diet, small quantities of aged cheese may be used as an aid to digestion, but large quantities should be avoided. Fish of all kinds is a splendid article of diet for the tubercular patient. Fresh fish is best for steady diet, but salt and smoked are at times a splendid appetizer.

No condiments, spices, pickles or other articles of diet which are vinegar-soaked should be used.

The tubercular case must have plenty of fresh, pure air, and he must get it as Nature gives it, not artificially heated, and he should have it for the full twenty-four hours of each day.

Next in order is rest; and here, as with forced feeding, we think the pendulum has swung too far. Rest is good for the tubercular case when the fever is high, 101° and over, but to put a patient to bed and keep him there when it is 100° or under is in the vast majority of cases not only unnecessary but harmful, and it is particularly harmful if he is told to take his temperature every two hours and keep a record of it, for he can readily worry himself into a temperature of 100° or even higher. Our system of treatment puts the patient back into his regular occupation as soon as possible, even if the temperature does rise to 100° or higher during the afternoon, provided the occupation is not too detrimental to his health. We recognize the fact that he should work out-of-doors, but in large cities this is seldom practicable. Employment gives him the financial assistance he so often needs, and thus his mind is diverted from himself and his diseased condition.

Another reason why we think it best to keep the tubercular patient at work is that after six months or a year of absolute idleness, which has been forced upon him with daily injunctions that he must not exercise, he is firmly anchored to the thought that he cannot work and it is difficult for him again to take up active pursuits.

A third reason why absolute rest should be recommended with caution is that absolute rest of body for the tubercular means an overactive mind, for the tubercular (except in the last stages) is very active mentally, and if his mind is not occupied with pleasant thoughts it will be occupied with unpleasant ones, such as the precarious financial condition of his family and his own physical condition, which are ever-present worries of the large majority of these cases. For these reasons and many others we feel that it is best not to disturb the daily routine of these patients if it can be avoided, and, where absolutely necessary to disturb it, to do so as little as possible and for the shortest possible period of time. Do not let him become a parasite and reach the stage where he feels that he is an invalid and should make no effort to help himself. The man who is willing to fight for his living is willing to fight for his life, and when he reaches a state of mind where he is not willing to put forth his uttermost to get well there is no system of treatment on earth that will help him.

We cannot establish an arbitrary standard of how much work each patient should do. A sufficient standard, both as to temperature and amount of work to be done by him, is that he continues to improve both as to temperature and strength. If his sense of well-being increases, if his appetite and digestion are good and his bowels regular, if he sleeps well, if his temperature continues to drop, if his coughing spells grow less violent and less frequent, and if he is gaining or holding his own in weight, we can safely assume that he is progressing satisfactorily—and this without daily examination of his chest, which we believe should not be done oftener than once in two weeks unless some untoward symptoms arise, for the reason that too frequent examinations keep him unduly alarmed. These cases are already filled with fear from what they have read and because of what they have been told and are constantly being told by their friends and relatives, and at times by their doctor, regarding the incurability of tuberculosis. Because of these things, our first effort is to eliminate their fears and replace them with hope. Destroy a man's hope of recovery—and the Lord help him.

Our next emphasis is laid on cleanliness, both of living conditions and of body, and the latter cannot be had without the former. These cases perspire freely and therefore must bathe frequently with good soap and warm water, and we insist, in addition to this, that a cool sponge bath of magnesium-sulphate solution (1 to 16) be taken on rising and on retiring. It is exhilarating. This cold sponge can be given several times a day if the fever is high.

We now come to what we consider an essential, but which has been and is being relegated to the scrap-heap: *treatment of the tubercular patient.* Given sunlight, good food, fresh air, rest, and cleanliness, he is told that nothing more can be done for him. We believe otherwise, and quote the following cases to substantiate our belief. The first case has been reported twice, but his continued improvement impels us to report it again at this time as an example of what can be done under the most adverse circumstances.

Pulmonary

Case No. 114. Male. Age, 24. Came to us July 27, 1916, with a history of having had tuberculosis for a year, although he had not stopped work. His weight was 125 pounds; his temperature was 102.5°; pulse, 110; respiration, 36. For the past month he had been having severe chills every forenoon, when his lips were purple. He was coughing incessantly, although, so far as we know, he had not raised blood.

His temperature on August 5, 1916, was 103.4°; pulse, 120; respiration, 32. On the 10th his weight was 118 pounds. His temperature, pulse, and respiration rate continued to fall so that by October, 1916, they were normal, and his daily chills had all but disappeared. December 11, 1916 (four and one-half months after beginning treatment), his weight was 137 pounds, a gain of 19 pounds; his temperature was 98.2°; pulse, 72; respiration, 18. Remember that this occurred in four and one-half months, after a year's illness with pulmonary tuberculosis, with a large cavity in the upper lobe of his right lung, and in spite of the fact that he never lost a day from his work.

We do not recommend that patients with temperature above 101° work, but when we asked this man to stop work he replied that he could not, because he had a wife and baby to support and himself to feed. We then somewhat reluctantly took the case, because we felt he needed all the help he could get, although, under such adverse circumstances, we scarcely expected him to recover. However, he steadily continued to improve and today is apparently well—clinically so. He still has his cavity, and will continue to carry it. What other treatment would have produced the same results under the same circumstances?

His treatments consisted of ten minutes under the radiant lamp, followed by ten to fifteen minutes daily of actinic rays from the air-cooled lamp, until he had definite improvement (six weeks in this case), then thrice and twice a week. In August, 1917, he was accepted by the Draft Board.

The Michigan Boulevard Building X-ray Laboratory gave the following report on October 7, 1918 (see Plate XVI, opposite):

Case No. 35026. Mr. W.

Fibrocaseous tuberculosis of both upper lobes. The fresher infiltrates appear to be on the left side. Both apices clouded; no cavities apparent. Stereo plates would probably furnish additional details.

Diagnosis: Pulmonary tuberculosis.

Pulmonary

Case No. 0103. Female. Age, 28. In August, 1916, she began running a temperature and was constantly tired. Was in the Mercy Hospital, Chicago, for two weeks, where her case was pronounced pulmonary tuberculosis. At this time her temperature ran as high as 105° and she had pain in lower right thorax. September 1, 1916, she was sent to Denver, where she stayed for seven months, and then she went to Cheyenne, Wyo., for four months. During this time she had two hemorrhages. She came to us July 13, 1917, unable to work.

Treatments were given with radiant light for ten minutes, followed by the actinic rays for four minutes, gradually increasing to thirteen. Her cough decreased after the first week, when she

Case No. 114—Pulmonary Tuberculosis

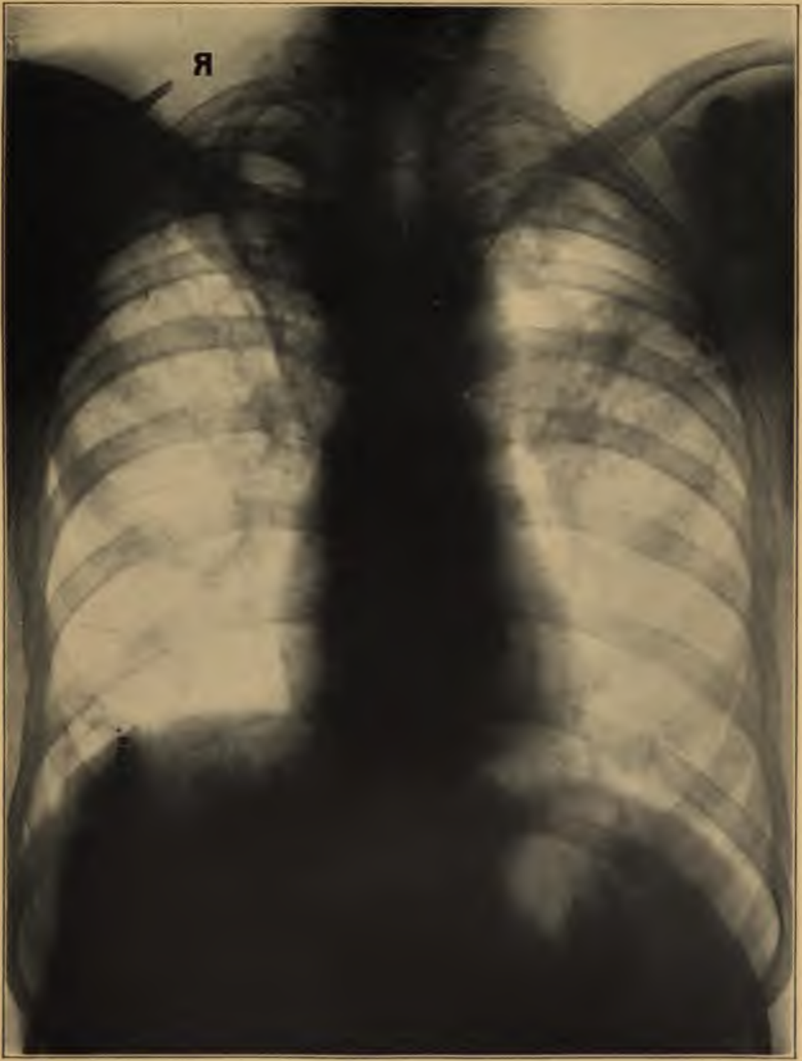
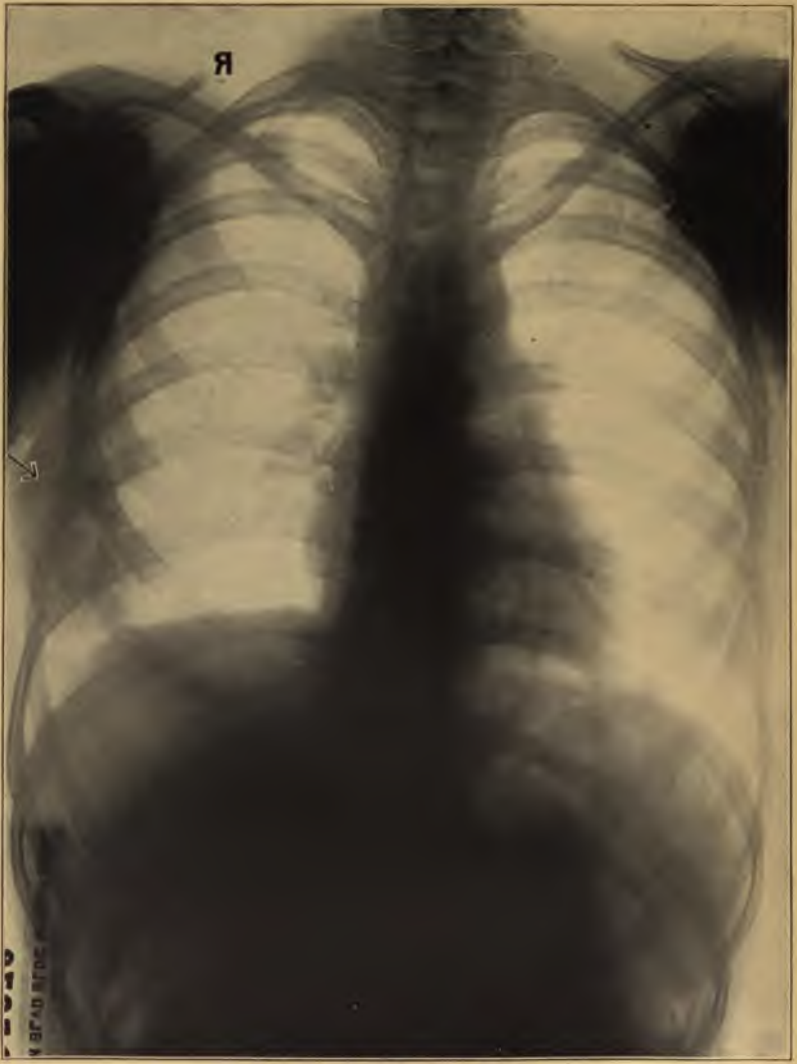


Plate XIX

Case No. 332B—Pulmonary Tuberculosis



Arrow indicates area drained.

Plate XX

started to work. In three weeks she was working as though nothing had happened. Her lung condition was improving rapidly, she coughed very little, and her general physical condition was very much improved. September, 1918, a letter from her stated that she was feeling fine and was employed as a school nurse.

Diagnosis: Pulmonary tuberculosis.

Pulmonary

Case No. 332B. Female. Age, 17. Contracted pneumonia in November, 1916, followed by an empyema in December, 1916, which was operated at the German-American Hospital, Chicago, during this month. We first saw her on September 28, 1917, at which time there was consolidation of the upper and middle lobes of the right lung. She coughed almost incessantly.

Her first treatment consisted of radiant light for ten minutes under the 2000-candlepower lamp and actinic rays for one minutes under the air-cooled lamp. These treatments were given daily for one month. The radiant light was used for ten minutes and the air-cooled lamp was started at one minute and increased one minute daily until a period of fifteen minutes was reached.

A blood count November 5, 1917, showed:

Erythrocytes	4,200,000
Leucocytes	26,400
Polymorphoneuclears	90%
Small lymphocytes	8%

She has improved steadily. During the second and third months, the treatments were given three times a week, the length of treatments at this time being ten minutes each with the radiant light and the actinic rays. There was no cough after the first month.

Actinic-ray treatments:

DATE	RADIANT LIGHT	ACTINIC RAYS		CLINICAL FINDINGS
		Air-cooled Lamp		
1917	Duration of Treatment	Duration of Treatment	Distance from Patient	
Sept. 28	20 min.	1 min.	20 in.	Coughing constantly. Continued pain. Consolidation of upper lobe of right lung. Weight, 112 pounds.
Sept. 29	15 min.	2 min.	16 in.	
Oct. 1	15 min.	3 min.	14 in.	
Oct. 2	15 min.	4 min.	12 in.	
Oct. 3	15 min.	5 min.	12 in.	
Oct. 4	15 min.	5 min.	10 in.	Improved.
Oct. 9	15 min.	8 min.	10 in.	Very much improved.
Oct. 15	15 min.	10 min.	10 in.	Feels very well.
Oct. 22	15 min.	10 min.	10 in.	No cough.
Oct. 27	15 min.	15 min.	10 in.	Some cough.
Nov. 1	15 min.	15 min.	10 in.	
Nov. 12	15 min.	12 min.	10 in.	Feels very well.
Nov. 26	10 min.	12 min.	10 in.	
Dec. 6	10 min.	12 min.	10 in.	
Dec. 19	15 min.	12 min.	10 in.	
Dec. 26	10 min.	12 min.	10 in.	Has slight cold.
1918				
Jan. 4	10 min.	10 min.	10 in.	
Jan. 17	10 min.	10 min.	10 in.	Lungs clear; feeling fine.
Feb. 1	10 min.	10 min.	10 in.	Never felt so well.
Feb. 21	10 min.	10 min.	10 in.	Weighs 125 pounds.

Pulmonary

Case No. 283. Male. Age, 27. Came to us August 27, 1917. He had been out of work for eleven months. He spent November, 1916, in the Naperville Sanatorium and was at the Winfield Sanatorium during January, February, March, and April, 1917. He was rejected by the Draft Board. His lesion was in the upper lobe of the right lung and his cough was almost continuous.

He took his first treatment August 27, 1917, which consisted of ten minutes with a 2000-candlepower radiant lamp and three minutes of actinic rays. On September 3d his cough had improved so much that he took steady employment.

His treatments were:

DATE	RADIANT LIGHT	ACTINIC RAYS		CLINICAL FINDINGS
		Air-cooled Lamp		
1917	Duration of Treatment	Duration of Treatment	Distance from Patient	
Aug. 27	10 min.	3 min.	20 in.	Coughing almost constantly.
Aug. 28	12 min.	4 min.	16 in.	
Aug. 30	15 min.	4 min.	14 in.	
Aug. 31	15 min.	5 min.	12 in.	Coughing decreased.
Sept. 1	15 min.	5 min.	12 in.	Worked half-day.
Sept. 2	15 min.	6 min.	12 in.	Much improved.
Sept. 3	15 min.	7 min.	12 in.	
Sept. 4	15 min.	8 min.	12 in.	
Sept. 5	15 min.	9 min.	12 in.	Very little cough.
Sept. 6	15 min.	10 min.	12 in.	Worked all day.
Sept. 7	15 min.	10 min.	12 in.	Worked in rain; feet wet.
Sept. 8	15 min.	10 min.	12 in.	
Sept. 10	10 min.	10 min.	12 in.	Very much improved.
Sept. 17	10 min.	10 min.	12 in.	
Sept. 22	10 min.	10 min.	12 in.	
Oct. 1	10 min.	10 min.	12 in.	
Oct. 6	10 min.	10 min.	12 in.	Some cough; smoking cigarettes.
Oct. 10	10 min.	10 min.	12 in.	Promised to quit smoking.
Oct. 25	10 min.	10 min.	12 in.	Improving nicely.
1918				
Mar. 4	10 min.	10 min.	12 in.	
April 12	10 min.	10 min.	12 in.	Reports himself in good condition.

Diagnosis: Pulmonary tuberculosis.

Pulmonary

Case No. 429. Male. Age, 29. Began coughing in January, 1917, when he was treated for bronchitis for four months. Went to Oak Forest Tubercular Sanatorium May 1, 1917, where he remained until October, 1917. Had been losing flesh constantly when he came to us, his weight being 117 pounds. Repeated examinations at Oak Forest Sanatorium, by the Health Department of Chicago, and by ourselves, showed numerous tubercle bacilli.

During the past year he had been examined by sixteen doctors, all of whom had pronounced the case incurable. When he came to us April 3, 1918, he was coughing continually; had severe night sweats; temperature, 102.2°; pulse, 150; respiration, 35; chest expansion, 82.5 and 88 cm. Treatments as follows:

DATE	RADIANT LIGHT	ACTINIC RAYS		CLINICAL FINDINGS
		Air-cooled Lamp		
1918	Duration of Treatment	Duration of Treatment	Distance from Patient	
April 3	10 min.	1 min.	18 in.	
April 4	10 min.	2 min.	16 in.	T., 101.4; P., 120; R., 30.
April 5	10 min.	3 min.	14 in.	T., 101.8; P., 110; R., 25.
April 6	10 min.	1 min.	10 in.	Burned.
April 8	10 min.	2 min.	10 in.	T., 102.2; P., 88; R., 20.
April 9	12 min.	3 min.	10 in.	
April 10	12 min.	4 min.	10 in.	T., 101.1; P., 85; R., 22.
April 11	12 min.	5 min.	10 in.	
April 12	12 min.	6 min.	10 in.	
April 13	10 min.	7 min.	10 in.	
April 15	10 min.	8 min.	10 in.	
April 18	10 min.	9 min.	10 in.	T., 102.2; P., 130; R., 30.
April 23	10 min.	10 min.	10 in.	T., 99.6; P., 100; R., 24.
April 29	10 min.	10 min.	10 in.	T., 102; P., 90; R., 28.
May 1	10 min.	10 min.	10 in.	T., 101.4; P., 92; R., 24.
May 9	10 min.	10 min.	10 in.	T., 101.4; P., 108; R., 24.
May 13	10 min.	15 min.	10 in.	T., 101.4; P., 108; R., 22.
May 20	10 min.	15 min.	10 in.	T., 98.6; P., 88; R., 20.
May 30	15 min.	15 min.	10 in.	T., 98.6; P., 80; R., 20.
June 3	10 min.	15 min.	10 in.	T., 99; P., 86; R., 20. Went to work on half time.
June 7	10 min.	15 min.	10 in.	T., 101.2; P., 104; R., 20.
June 18	10 min.	15 min.	10 in.	T., 99.2; P., 92; R., 20. Working full time.
July 3	10 min.	15 min.	10 in.	T., 99.2; P., 104; R., 22. Weighs 128½ pounds.
July 18	10 min.	15 min.	10 in.	T., 102.2; P., 88; R., 20.
July 31	10 min.	10 min.	10 in.	T., 98.5; P., 88; R., 20. Weighs 130. Feeling fine.
Aug. 8	10 min.	10 min.	10 in.	Working every day.
Aug. 13	10 min.	10 min.	10 in.	
Aug. 22	10 min.	10 min.	10 in.	
Aug. 31	10 min.	10 min.	10 in.	T., 102; P., 100; R., 28.
Sept. 3	10 min.	10 min.	10 in.	Influenza.
Sept. 7	15 min.	15 min.	10 in.	T., 102; P., 100; R., 22.
Sept. 9	15 min.	15 min.	10 in.	Severe pain in lower left pleura. Stopped work.
Sept. 10	45 min.	10 min.	10 in.	Lower left chest bulging from effusion in pleural cavity.
Sept. 11	45 min.	10 min.	10 in.	Less pain.
Sept. 12	40 min.	10 min.	10 in.	Less pain.
Sept. 13	40 min.	10 min.	10 in.	Much improved.
Sept. 14	40 min.	10 min.	10 in.	No pain.
Sept. 16	15 min.	10 min.	10 in.	Weighs 122. Returned to work.

(Continued on next page)

Case No. 429—Pulmonary Tuberculosis

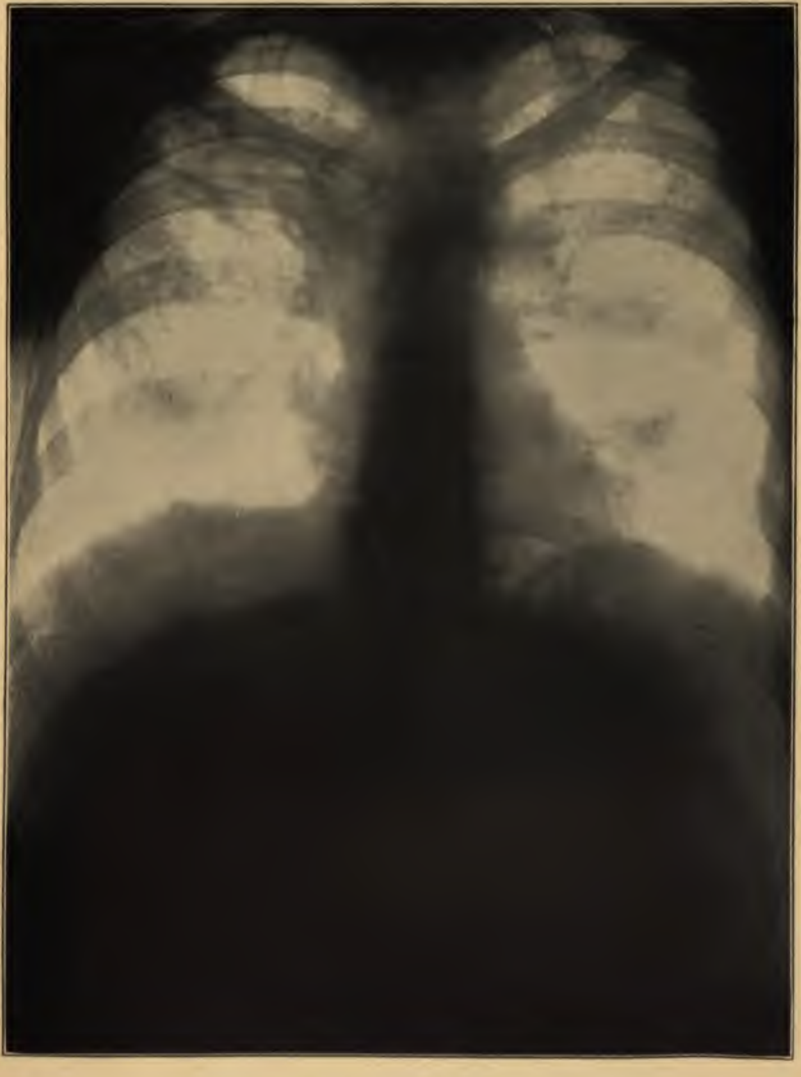


Plate XXI

DATE	RADIANT LIGHT	ACTINIC RAYS		CLINICAL FINDINGS
		Air-cooled Lamp		
1918	Duration of Treatment	Duration of Treatment	Distance from Patient	
Sept. 23	10 min.	10 min.	10 in.	
Sept. 30	10 min.	10 min.	10 in.	
Oct. 2	15 min.	10 min.	10 in.	T., 103; P., 104; R., 24.
Oct. 5	10 min.	10 min.	10 in.	Weighs 107.
Oct. 12	10 min.	10 min.	10 in.	T., 101; P., 100; R., 20. Weighs 110.
Oct. 21	10 min.	10 min.	10 in.	T., 101; P., 100; R., 22.
Oct. 30	10 min.	10 min.	10 in.	T., 99; P., 84; R., 20.
Nov. 6	10 min.	10 min.	10 in.	Weighs 114.
Nov. 15	10 min.	10 min.	10 in.	Weighs 115.
Nov. 26	10 min.	10 min.	10 in.	Weighs 118. Has not felt so well in years.
Dec. 30	10 min.	10 min.	10 in.	Weighs 126.

Diagnosis: Pulmonary tuberculosis.

Pulmonary

Case No. 475. Male. Age, 22. Referred by Dr. George Starr White, Los Angeles, Cal. Was sick and out of school in 1914 and a part of 1915; began to fail again in 1917 and had to quit school at Christmas time. He had been rejected twice by the Draft Board on account of his lung condition. He had lost 15 pounds in weight and weighed 120. Had had constant pain in the upper right thorax. Physical examination showed a consolidated area of about 4 x 6 cm. and auscultation gave rales on deep inspiration.

His actinic-ray treatments were as follows:

DATE	RADIANT LIGHT	ACTINIC RAYS		CLINICAL FINDINGS
		Air-cooled Lamp		
1918	Duration of Treatment	Duration of Treatment	Distance from Patient	
June 15	10 min.	1 min.	20 in.	
June 17	10 min.	2 min.	16 in.	
June 18	10 min.	3 min.	14 in.	
June 20	10 min.	5 min.	12 in.	
June 24	10 min.	5 min.	12 in.	General condition improving.
June 29	10 min.	6 min.	12 in.	Weighs 122½ pounds.
July 1	10 min.	7 min.	12 in.	No pain in right side.
July 3	10 min.	7 min.	12 in.	
July 6	10 min.	8 min.	12 in.	Weighs 127 pounds.
July 10	10 min.	9 min.	12 in.	Very much improved.
July 17	10 min.	10 min.	12 in.	No pain.
July 23	10 min.	10 min.	12 in.	
July 27	10 min.	10 min.	12 in.	
Aug. 2	10 min.	10 min.	12 in.	
Aug. 9	10 min.	10 min.	12 in.	Has gone to work.

Diagnosis: Pulmonary tuberculosis.

Adenitis

Case No. 130. Male. Age, 23. Referred by Dr. B. A. McBurney, Pomona, Cal. Had had three operations for tubercular cervical glands within a year when he came to us October 16, 1916. At this time he had five sinuses discharging freely, and an area of skin tuberculosis surrounding them of about 10 x 15 cm. His head was so drawn to one side from pain and muscular contraction that he had been using three pillows to make himself comfortable while sleeping. His appetite was poor. He had been out of work for eleven months.

We began actinic-ray treatment at once with the water-cooled lamp, and the following night he dispensed with two of his pillows. Other treatments were given on the 18th, 20th, 23d, 26th, 30th, and on November 3d, at which time he returned to work. All sinuses had stopped running after the sixth treatment. We saw him in March, 1918. He had remained well and had not lost a day from his work.

Adenitis

Case No. 295. Male. Age, 16. Nine months ago noticed lumps in the left cervical region. Three months ago they broke down and have been discharging freely ever since.

The following actinic-ray treatments were given:

DATE	ACTINIC RAYS		CLINICAL FINDINGS
	Air-cooled Lamp		
1918	Duration of Treatment	Distance from Patient	
Mar. 8	7 min.	8 min.	
Mar. 9	7 min.	6 min.	Improved.
Mar. 11	12 min.	4 min.	Sinuses healing.
Mar. 16	9 min.	4 min.	Much improved.
Mar. 20	10 min.	3 min.	Nearly well.
Mar. 23	10 min.	3 min.	
April 1	6 min.	3 min.	
April 3	6 min.	3 min.	Dismissed.

Diagnosis: Tubercular adenitis.

Epididymal

Case No. 498. Male. Age, 42. Referred by Dr. William H. FitzGerald, Hartford, Conn. Came to us July 25, 1916, with the following history: One year ago his voice became hoarse, followed shortly by pain in the region of his larynx, and the condition was diagnosed cancer with a bad prognosis. He began treatment with Dr. William H. FitzGerald of Hartford, Conn., who treated him with zone therapy. Dr. FitzGerald wrote us that when the patient began taking treatments from him he had an ulcer in the larynx the size of a nickel. When he came to us the larynx was free from every sign of disease.

In June, 1918, his right testicle began to swell and pain. He was examined by Drs. R. J. Boyle, P. Ryan, W. Daly, and W. McClellan of Hartford, Conn., who pronounced it cancer, and when they examined him found that the prostate also was enlarged, nodular, inflamed, and tender, and declared this also cancerous and gave him six weeks to live.

On examining him July 25, 1918, we found the testicle to measure 4 x 7 cm. It was dark red, adherent to the skin, and extremely sensitive. The prostate was very much enlarged, nodular, and tender. He could not walk a block. There was no history of venereal disease, no urethral discharge, no pain on urinating, no strictures. After a careful examination we began treatment by using radiant light for twenty minutes and actinic rays for one minute, gradually increasing the actinic-ray treatments to ten minutes. These treatments were given internally through a small proctoscope for the prostate and externally over the testicle at a distance of about one inch.

After six treatments the patient could walk a fourth of a mile, and after fourteen treatments he had no pain or soreness and his weight had increased from 136 to 144 pounds. There have been no symptoms to report since this time, and both prostate and testicle have decreased in size until they are nearly normal. His regular weight is 160 pounds. On July 25, 1918, it was 136 and on September 23, 1918, it was 150 pounds. No medicine was used.

His treatments were as follows:

DATE	RADIANT LIGHT	ACTINIC RAYS				CLINICAL FINDINGS
		Duration of Treatment		Distance from Patient		
1918	Duration of Treatment	Air-cooled Lamp	Water-cooled Lamp	Air-cooled Lamp	Water-cooled Lamp	
July 25	20 min.	....	....	.....	....	Weight, 136 pounds.
July 26	20 min.	1 min.	7 min.	20 in.	1 in.	
July 27	20 min.	3 min.	7 min.	18 in.	1 in.	Scrotum blistered. Less pain.
July 28	20 min.	3 min.	7 min.	14 in.	1 in.	
July 30	20 min.	4 min.	5 min.	12 in.	1 in.	Less swelling. Prostate smaller.
July 31	20 min.	4 min.	5 min.	12 in.	1 in.	Can walk one-quarter mile.
Aug. 1	20 min.	4 min.	5 min.	12 in.	1 in.	
Aug. 2	20 min.	4 min.	5 min.	12 in.	1 in.	Much improved.
Aug. 3	20 min.	4 min.	5 min.	12 in.	1 in.	Very little pain.
Aug. 4	20 min.	5 min.	5 min.	12 in.	1 in.	Can walk one-half mile without pain.
Aug. 6	20 min.	5 min.	5 min.	12 in.	1 in.	
Aug. 7	20 min.	6 min.	5 min.	12 in.	1 in.	No soreness or pain.
Aug. 8	20 min.	6 min.	5 min.	12 in.	1 in.	Prostate much smaller and softer.
Aug. 9	15 min.	6 min.	5 min.	12 in.	1 in.	
Aug. 10	15 min.	8 min.	5 min.	12 in.	1 in.	
Aug. 12	15 min.	10 min.	5 min.	12 in.	1 in.	Weighs 144.
Aug. 14	15 min.	10 min.	5 min.	12 in.	1 in.	Weighs 146.
Aug. 19	10 min.	10 min.	5 min.	12 in.	1 in.	Can walk three miles. No pain or soreness.
Aug. 21	10 min.	10 min.	10 min.	12 in.	1 in.	
Aug. 26	10 min.	10 min.	10 min.	12 in.	1 in.	No pain or soreness.
Sept. 2	10 min.	10 min.	10 min.	12 in.	1 in.	Feels perfectly well.
Sept. 5	10 min.	10 min.	10 min.	12 in.	1 in.	
Sept. 12	10 min.	10 min.	10 min.	12 in.	1 in.	
Sept. 20	10 min.	10 min.	10 min.	12 in.	1 in.	
Oct. 1	10 min.	10 min.	10 min.	12 in.	1 in.	
Oct. 8	....	....	....	.....	....	Went home clinically well.

Diagnosis: Tuberculosis.

Joint

Case No. 281. Female. Age, 13. Came to our office August 6, 1917, with the following history: Two years ago she noticed a lump on her left elbow, but nothing was done for it until November, 1916, when Dr. J. R. Buckbinder, Chicago, by the use of tuberculin tests, pronounced it tuberculosis of the elbow and put the arm in a plaster cast, with instructions to keep it there for one year. When she came to us the elbow was badly swollen and edematous, nearly fixed (movement not to exceed 10 degrees) at about a right angle and very sensitive to touch. X-ray pictures showed involvement of radius, ulna, and humerus.

We began treatments at once with radiant light and actinic rays. After the fifth treatment she was able to dispense with the cast, and after ten treatments she dispensed with the sling and was gaining daily in extension. There was no pain or soreness after the fifth treatment, and her general health was greatly improved.

The treatments were:

DATE	RADIANT LIGHT	ACTINIC RAYS		CLINICAL FINDINGS
		Air-cooled Lamp		
1917	Duration of Treatment	Duration of Treatment	Distance from Patient	
Aug. 6	15 min.	2 min.	20 in.	
Aug. 7	20 min.	3 min.	18 in.	X-ray shows all bones of elbow involved.
Aug. 8	15 min.	4 min.	18 in.	Less swelling.
Aug. 9	20 min.	....	.....	Blistered.
Aug. 10	20 min.	4 min.	16 in.	Out of cast.
Aug. 11	20 min.	5 min.	14 in.	
Aug. 13	20 min.	5 min.	12 in.	No pain.
Aug. 16	20 min.	7 min.	10 in.	Can move arm more freely.
Aug. 18	20 min.	8 min.	10 in.	Out of sling. Told to use arm slightly.
Aug. 22	15 min.	10 min.	10 in.	Flexion of 20 degrees.
Aug. 27	15 min.	10 min.	10 in.	
Sept. 8	20 min.	10 min.	10 in.	Feeling fine.
Sept. 17	10 min.	10 min.	10 in.	
Sept. 19	10 min.	10 min.	10 in.	
Sept. 20	10 min.	10 min.	10 in.	Using arm freely. Extension within 15 degrees of normal.

Rectal

Case No. 467. Female. Age, 34. Referred by Dr.................., Chicago. In September, 1916, she had severe pain throughout the pelvis and was operated for an ovarian cyst by Dr. Harry Timen, Chicago. Following the operation she suffered very much from constipation, and the pain continued throughout the lower abdomen. On February 14, 1918, she was reoperated by Dr. ...., Chicago, who found a growth about fourteen inches in extent along the rectum and sigmoid. She also had several fistulas, and the bowel was closing so rapidly that it was thought best to do a cecal colotomy, in order that the colon might be irrigated.

At this time Dr. W. H. Wilson, pathologist at Hahnemann Hospital, Chicago, pronounced the condition tubercular. On May 22, 1918, the nurses of Hahnemann Hospital were unable to introduce the smallest catheter into the rectum. It was at this time that she was referred to us for actinic-ray treatments. She now weighed 87 pounds, her regular weight being 125. Her temperature was 103-104°; pulse, 150-160; night sweats so severe that her gowns were changed at least every hour; her appetite was poor and she was in constant pain.

After two actinic-ray treatments with the water-cooled lamp, the first of one minute and the second of two minutes, she began to improve, and we were enabled to introduce a small cystoscope five inches into the rectum. Her treatments were then increased about a minute a day until they reached ten minutes. May 29th she was out of bed part of the time; June 5th she was able to walk around the hospital; and on June 26th she went home. On June 28th she came to the office for treatments, a distance of thirty miles.

The treatments were as follows:

DATE	RADIANT LIGHT	ACTINIC RAYS				CLINICAL FINDINGS
		Duration of Treatment		Distance from Patient		
1918	Duration of Treatment	Air-cooled Lamp	Water-cooled Lamp	Air-cooled Lamp	Water-cooled Lamp	
June 28	10 min.	1 min.	4 min.	20 in.	Spec.	
July 1	10 min.	1 min.	4 min.	18 in.	Spec.	
July 3	10 min.	3 min.	4 min.	14 in.	Spec.	T., 99.5; P., 96; R., 18.
July 8	10 min.	6 min.	4 min.	12 in.	Spec.	T., 100.6; P., 96; R., 18.
July 16	20 min.	5 min.	4 min.	12 in.	Spec.	Now weighs 90 pounds, a gain of three pounds.
July 18	20 min.	8 min.	4 min.	12 in.	Spec.	
July 29	10 min.	10 min.	4 min.	12 in.	Spec.	Weight, 92½ pounds.
Aug. 1	10 min.	10 min.	4 min.	10 in.	Spec.	
Aug. 5	10 min.	10 min.	4 min.	10 in.	Spec.	Weight, 95 pounds.
Aug. 10	10 min.	10 min.	2 min.	10 in.	Spec.	No night sweats since leaving the hospital.
Sept. 6	10 min.	10 min.	2 min.	10 in.	Spec.	
Sept. 17	10 min.	10 min.	2 min.	10 in.	Spec.	Losing strength.
Sept. 23	10 min.	10 min.	2 min.	10 in.	Spec.	Feels tired out.
Oct. 5	10 min.	10 min.	2 min.	10 in.	Spec.	
Oct. 11	10 min.	10 min.	2 min.	10 in.	Spec.	

Since this time the course of the disease has been irregular. She had to travel thirty miles to take her treatments. Such cases should be treated in sanatoria, where their strength could be conserved to the utmost.

Spinal

Case No. 232. Female. Age, 18. Referred to us by Dr. Emil Raschke, La Grange, Ill. Exhibited tenderness in left lumbar region, both anterior and posterior. Bulging apparent posteriorly along left lumbar spine. Temperature, 100°; pulse, 110. She had been treated for a year with no improvement.

Her actinic-ray treatments were as follows:

DATE	RADIANT LIGHT	ACTINIC RAYS		CLINICAL FINDINGS
		Air-cooled Lamp		
1917	Duration of Treatment	Duration of Treatment	Distance from Patient	
Aug. 30	15 min.	2 min.	20 in.	
Sept. 1	15 min.	3 min.	18 in.	
Sept. 4	15 min.	4 min.	16 in.	Lumbar region less sensitive.
Sept. 6	15 min.	5 min.	14 in.	
Sept. 8	15 min.	6 min.	12 in.	
Sept. 11	15 min.	7 min.	12 in.	Not sensitive posterior.
Sept. 14	15 min.	8 min.	12 in.	Slight sensitiveness anterior
Sept. 18	15 min.	10 min.	12 in.	T., 99; P., 108; R., 20.
Sept. 21	15 min.	10 min.	12 in.	
Sept. 25	15 min.	10 min.	12 in.	
Sept. 29	15 min.	10 min.	12 in.	
Oct. 5	15 min.	10 min.	12 in.	Spine does not trouble her at all.
Oct. 13	15 min.	10 min.	12 in.	
Oct. 23	15 min.	12 min.	12 in.	Feeling fine.
Nov. 2	15 min.	12 min.	12 in.	
Nov. 13	15 min.	12 min.	12 in.	
Nov. 21	15 min.	12 min.	12 in.	
Dec. 3	15 min.	12 min.	12 in.	
Dec. 12	15 min.	12 min.	12 in.	
Dec. 28	15 min.	12 min.	12 in.	In splendid condition. Dismissed. No other treatment used.

TURBINATES HYPERTROPHIED

Case No. 357. Male. Age, 18. Turbinates hypertrophied for several years until they almost blocked the nasal passages, compelling mouth breathing.

Actinic-ray treatments as follows:

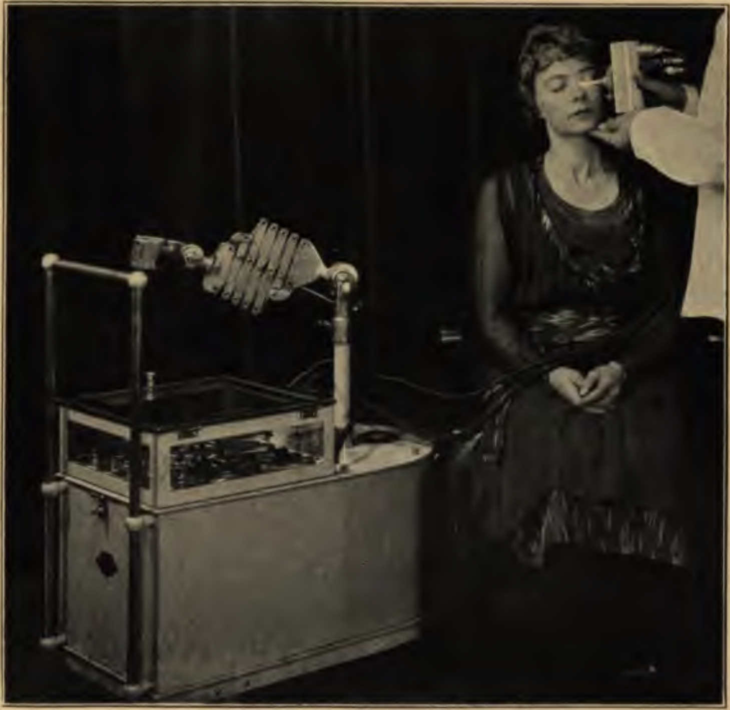
DATE	ACTINIC RAYS		CLINICAL FINDINGS
	Water-cooled Lamp		
1917	Duration of Treatment	Distance from Patient	
Oct. 30	2 min.	Contact	Nasal passages nearly closed.
Nov. 2	2 min.	Contact	Could breathe more freely twenty minutes after first treatment.
Nov. 6	2 min.	Contact	
Nov. 9	2 min.	Contact	
Nov. 20	2 min.	Contact	
Nov. 23	3 min.	Contact	Can breathe freely through nose.
Nov. 30	3 min.	Contact	
Dec. 3	4 min.	Contact	
Dec. 5	4 min.	Contact	
Dec. 12	4 min.	Contact	
Dec. 19	4 min.	Contact	Plenty of breathing space. Dismissed.

VESICULITIS

Case No. 249. Age, 26. Neisserian infection four years ago. Now suffering from vesiculitis; no strictures.

Actinic-ray treatments, through our special proctoscope, as given below:

DATE	ACTINIC RAYS	PROSTATE MASSAGE	CLINICAL FINDINGS
	Water-cooled Lamp		
1917	Duration of Treatment	Duration of Treatment	
Nov. 10	8 min.	4 min.	
Nov. 20	10 min.	4 min.	
Nov. 28	10 min.	4 min.	Sleeping improved.
Dec. 3	10 min.	4 min.	
Dec. 8	10 min.	4 min.	
Dec. 15	10 min.	4 min.	
Dec. 21	10 min.	4 min.	
1918			
Jan. 1	10 min.	4 min.	No discharge.
Jan. 14	10 min.	4 min.	Feeling much better.

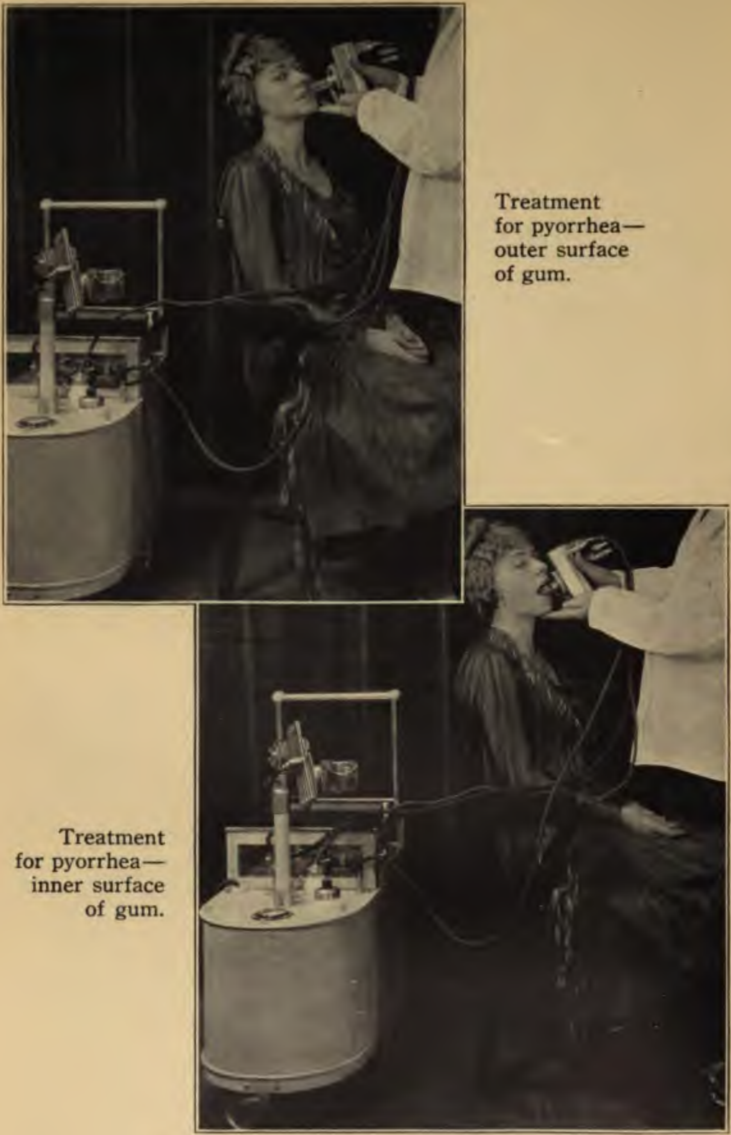


Local application for small areas.

Nasal treatment.

Aural treatment.

Plate XXII



Treatment
for pyorrhea—
outer surface
of gum.

Treatment
for pyorrhea—
inner surface
of gum.

Plate XXII-A

CHAPTER V

ADDITIONAL DATA

MANY new facts have been added to our previous knowledge of actinic rays. That they are of extreme value in constitutional disorders has been verified by those who use these rays. That nothing except drainage even equals them in sepsis has been proved beyond doubt. That they will not destroy malignancies unaided is a known fact, but that they are of extreme value for the anemia secondary to a malignancy also is without question.

One advanced case of anemia with a 15 per cent hemoglobin reached 25 per cent in ten days, or one per cent a day when treated with the rays; the erythrocytes climbing from 1,400,000 to 2,500,000 in the same time, or 110,000 daily, while the leucocytes increased from 4000 to 6400, or 240 daily, proving what we have contended for years—that the erythrocytes are increased while the leucocytes are normalized. In thirty days this same case recorded hemoglobin 40 per cent, erythrocytes 3,900,000, leucocytes 7900, and this despite the fact that the malignant tumor continued to grow.

To treat a malignant tumor and neglect the possessor of it is the height of folly, for cancers are blood conditions with local manifestations, the removal of which adds but little to the comfort or longevity of the patient unless something is done to correct the hemogenesis. Ross many years ago obtained definite benefit with potash salts. The profession did not take kindly to the suggestion, so it was "sown on stony ground"; but for several years we have been making extensive experiments along these lines with some remarkable results.

Fallopian-tube infections are readily relieved with the water-cooled lamp when it is used in conjunction with general radiant light and actinic ray treatments. One patient who had been in bed ten weeks was relieved of pain in twenty-four hours and was able to be about in forty-eight hours. There was no return of pain and the tubes slowly returned to their normal size.

A second case of seven weeks' standing, who was bedridden and had a temperature of 104.5°, had a normal morning temperature after forty-eight hours and a normal evening temperature at the end of one week. No after operation in either case.

A male Neisserian case of eight weeks' standing which was discharging freely stopped in six days, with daily three-minute treatments.

Our previous assertions concerning the use of actinic rays in Neisserian infections have been reaffirmed. Time and further use of the rays along this line have demonstrated that we were modest in our claims, for many a case of pyosalpinx has recovered health, and in some cases borne offspring, where it had seemed imperative to operate. The pain is usually relieved in forty-eight to seventy-two hours, while the temperature should remain at normal within a week. Cultures are usually sterile within a week after daily treatment, which, with modern lamps, should be of three to ten minutes' duration, vaginally or rectally, and general treatments of from one-fourth to six minutes following a radiant light treatment of ten to thirty minutes. What has been said of salpingitis applies also to prostatitis and vesiculitis.

Cases of psoriasis are greatly benefited in one treatment and heal rapidly after six or seven treatments, which should be given with the water-cooled lamp for one-half to one minute one week apart.

Life forces are chemical. Electrons are chemical forces in action, tearing themselves apart yet binding the mass together. On page 17 of this book will be found the statement that "whether the actinic rays absorbed by the blood stream excite chemical, electrical, or thermal action, it is probable that electrons are developed which, when coming in contact with substances within the blood stream, produce constructive rays which are as yet unidentified." These unidentified rays undoubtedly have a greater constructive power than the actinic rays.

We seem in a fair way now of amplifying the above, as Dr. C. M. Sampson (Capt. M. C., U. S. A.) has made experiments which apparently prove that either the actinic rays are themselves carried by the blood stream or that other rays are developed, for he was able to fog a plate placed under the calf of the leg when the actinic rays were thrown upon the opposite shoulder. It is absolutely certain now that the only light rays which are effective, be they visible or invisible, are the ones stopped by the tissues.

Dr. J. D. Gibson, Denver, Colorado, working along this line, is able to arrest tuberculosis by stopping the X-ray within the thorax. The excessive action of the X-ray is well demonstrated by its burns, which are but the effect of the stoppage of the alpha and beta rays in the integument. Remove these by filtration and the surface is not damaged and deep effects are produced. This is now well proved by the work done by Professor Herman Weintz at Erlangen University, Erlangen, Bavaria, who is using enormous doses of X-ray, 220,000 volts with an eighteen-inch backup at three feet distance, for from one to eight hours, through heavy filters.

The above statement applies also to radium, the rays of which are described as harder, meaning, in simple language, that they are shorter and therefore of greater penetrative power. Only one one-thousandth of the radium rays are of the gamma type, but for these to be effective on the deeper tissues it is absolutely necessary to remove the other nine hundred and ninety nine by filtration, which is done with various substances, as wood, leather, the various metals and air. One inch of air removes most of the alpha rays. X-ray or radium (alpha, beta and gamma) rays are actinic rays of exceedingly short wave length.

Now if the action of a light ray is dependent upon its stoppage, and the stoppage of the actinic rays by the blood stream is a fact, as proved by Finsen, and if this stoppage is deleterious to blood pathology either by destructive or constructive action, then we have a sufficient reason for the improvement of diseased conditions within the human body. That chemical changes are produced by the action of actinic rays upon the blood stream we are now certain, and we hope to produce the evidence upon which this assertion is based within the next year.

Masses of evidence are now at hand proving former statements that bacteria cannot live in actinic rays. Moore* obtained the following results with the mercury-quartz lamp: "Fresh bacteria in emulsion of normal salt solution or water when exposed to the carbon arc at a distance of three feet were not killed in fifteen minutes.

"In similar preparations of the same strains of bacteria exposed twenty inches from the mercury-quartz vapor lamp the live organisms were markedly diminished in five minutes and practically all destroyed in from fifteen to twenty minutes.

"The same organisms when prepared in emulsions of beef broth and peptone water solution were apparently but little affected after exposures of thirty to sixty minutes. Some substances in these solutions appeared to protect the bacteria from the lethal rays.

"The bacteria employed in the experiments were bacillus prodigiosus, bacillus coli communis, bacillus cloaca, streptococcus hemolyticus, staphylococcus viridans and staphylococcus pyogenes aureus.

"The rays of the mercury-quartz vapor lamp had a greater bactericidal effect upon the cocci than upon the bacilli."

Fungi are readily killed, for which a second's time is sufficient; and the smaller insects soon show the destructive effects when exposed to the rays, while flies can live through but a few minutes of constant exposure to the rays from a mercury-quartz vapor lamp.

Diphtheritic membranes are rendered sterile in two or three minutes with modern actinic-ray water-cooled lamps.

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*J. J. Moore, University of Illinois College of Medicine: (Personal Communication).

The General Electric Company put out a lamp which they guarantee will kill all bacteria in a twelve-inch column of water as it passes the lamp.

Cell structures may be transparent to radiant light yet opaque to actinic rays and this explains the statement above that opacity means absorption and absorption means chemical change and this change may be beneficial or destructive according to the kind of tissue acted upon, the length of exposure, and the frequency of the vibratory wave. If too short for the absorption the action will be slight, while if all the waves are absorbed and the quantity is sufficient, destruction is inevitable.

In studying the action of light rays upon cell life remember that the cell, though microscopic or ultra-microscopic, is composed of different structures, all of which are acted upon differently by the same light frequency. The presence of dyestuffs in the blood stream causes the absorption of certain light frequencies, hence changes the action of any light from a given source. The distance of the source of light from the object exposed changes the effective frequency and of course alters materially the therapeutic effect.

Photography by actinic rays is the acme of this science today and photography of intravital cell structure through staining may by the same process be its acme in the near future.

Fluorescence is now readily induced in various chemicals both within and without the body by actinic rays. When actinic rays are fully analyzed by the scientist much new information will be gained, for it is well known that the colors emitted by fluorescent substances differ according to their chemical composition, hence the possibility of detection of minute chemistry by this method, which is impossible by present-day chemical analyses. That all chemical elements throw definite lines regardless of the minuteness of the particle or the distance from the instrument used is so well known as to place it beyond the pale of argument. This is without question for the chemistry of the sun has been spectrographed and photographed.

Intravital staining was first brought to the attention of the scientific world by Ehrlich in 1886, when he proved that methylene-blue stains living nerve tissues. Since that time he has used various dyes and holds that certain dyes have special affinities for specific portions of protoplasmic molecules; however, these special affinities are modified or accelerated in various ways. Ionization, actinic rays, etc., change the character of certain dyes and may cause an increase in the amount absorbed by the protoplasmic molecules. In this connection it must be remembered that short-light rays and electrons are nearing the limits of present-day knowledge.

Do not forget that living nuclei are apparently unstainable. It has been proved that protoplasm contains all the chemical elements found in organic compounds together with various salts of these elements. Whether substances can be divided into the organic and inorganic compounds is today a debatable question. Some of the foremost scientists think this division impossible and that everything is simple chemistry indivisible.

Nitrogenous bodies known as proteins are highly complex chemical reactions taking place during metabolism which require certain lipoids, carbohydrates and water for their completion. Living protoplasm presents the characteristics of liquids, but when death occurs it becomes gelatinoid and all parts fixed. Apparent death of a cell may take place and yet resuscitation occur by electrical or light (vibratory) stimulation.

Cell chemistry as we know it is a substance in equilibrium, and living cells as we know them are in a state of constant change which is dependent upon the food supply and the ability of the cell to assimilate the food supplied.

Bayliss, in "Principles of General Physiology," states, "A theory has been developed by Bodenstein (1913) according to which the first effect of light is to decompose a group into electrons and electro-positive remainder. Each of these gives rise subsequently to chemical changes of a particular kind. A fact common to all photo-chemical reactions may be mentioned here, namely, that the action of light is similar to that of a *high temperature.*

"In the first place, we find that the rate of the reaction does not follow the simple law of *mass action.* This is due to the fact that it is controlled by the amount of light energy absorbed per unit time and not by the actual number of molecules present. An instructive case is that of the oxidation of quinine by chromic acid in light, as investigated by Luther and Forbes (1909). The order of this reaction depends on the colour of the light; violet light is only slightly absorbed and the reaction is unimolecular, while ultra-violet light is strongly absorbed and the order is very much lower; since this light is *totally* absorbed, the rate of the reaction is independent of the concentration of the reacting substances.

"The initial phase of all photo-chemical reactions is accompanied by the actual consumption of light energy to set in motion a reaction, although it may afterwards proceed with the evolution of energy. We have seen in Chapter Ten that a catalyst adds no energy to a reaction system, but merely accelerates the *rate* at which such a reaction arrives at equilibrium. Further, in many reactions, such as the decomposition of carbon dioxide by the green leaf, the reaction is actually caused to proceed in the direction *opposite* to that in which it goes naturally at the temperature of the reaction. But, in many cases, a catalyst is formed by the action of light, and this catalyst then proceeds, independently of the light reaction proper, to perform its usual function of accelerating the natural course of the reaction. In this case, contrary to that of the chlorophyl system, the net result of the change is a *diminution* in the free energy of the system.

"In photo-chemical changes—before the stationary condition is reached, part of the light energy becomes chemical energy. Another example is that of the formation of ozone from oxygen by ultra-violet light.

"A striking fact, which may appropriately be mentioned here, is that the *temperature coefficient* of a light reaction is [illegible] much lower than that of a chemical reaction proper. This follows from the fact that the rate of the photo-chemical change depends on that of the absorption of light, which varies only very slightly with temperature.

"Decay dissolution starts a reaction which goes on independent of itself. One of the best known of all catalytic light reactions, namely, the combination of hydrogen and chlorine under the action of ultra-violet light, belongs to this group. A great number of investigations have been made on this reaction since the first exact research by Bunsen and Roscoe (1855-1859).

"Compared with the reactions in which light energy is stored up, and often in considerable amount, these catalytic reactions require little energy to form the catalyst, and are, as a rule, very sensitive.

"Dyes increase the absorption of certain light rays within the tissues, hence increase the reaction.

"Iodine set free by light remains active after the light has ceased to act, and continues so for several days. Moreover, if a solution which has been exposed to the light be added to an unexposed one, decomposition of the latter sets in.

"The capacity of being developed at any time after exposure, possessed by photographic plates, is another case. We cannot here discuss the nature of the latent image. The reduction-potential of the developer is not sufficiently high to effect unexposed silver bromide at any considerable rate; but, where the light has formed a catalyst, metallic silver is produced in development. It appears that the acceleration is due to absorption of developer on the surface of the heterogeneous catalyst, by which the concentration of the former is raised and, with it, the reduction-potential. (See remarks of Weigert, 1911, page 74.)

"It is clear that, in these cases of catalytic action, if we could add the catalyst in any other way than by the action of light, the results would be the same. This is not so in the three first cases of our list, where the same products of reaction as those produced by light cannot be obtained in the dark, at the same temperature, by other means.

"It was shown by Hardy that the negatively charged β-particles of radium produce coagulation of oppositely charged colloids, and the effect appears to be an electrical one."

The effects produced by radium on living tissues *are very similar to those of intense ultra-violet light, but more powerful.* X-rays are generally regarded as being light waves of extremely short wave-length, while the hard gamma rays of radium are still shorter. They have been used in therapeutics for similar purposes. The explanation of their action is not yet clear. The advantage of radium regarding the ease of application required is obvious. For further information on the extremely interesting phenomena of radio-activity, the reader is referred to the books by Rutherford (1913) and Soddy (1911, 1914) and, regarding its action on living tissues, to that by Finzi (1914).

In this connection it is certain that only the absorbed rays are active, that is, they are the only ones which produce results, either constructive or destructive. The constructive results are brought about by chemical changes which are started by the actinic rays inducing a retrograde process in a pathological cell. Now then if we continue an actinic ray application long enough we increase the pathology of the cell or produce it in a normal cell, hence the action is dependent upon the length of the light waves, the length of the application, the contiguity, and the present character of the tissues being rayed.

Bayliss further states, "The amount of light absorbed by a medium of various thicknesses is regulated by Lambert's law, which states that it is a logarithmic function of the thickness.

"Photo-chemical reactions do not obey the law of mass action, because their rate is controlled by the amount of light energy absorbed per unit of time.

"The efficiency of the photo-synthetic process is, at its optimum, a high one.

"Many of the constituents of living cells absorb ultra-violet light to a considerable degree.

"The reaction of certain small animal organisms to ultra-violet light obeys definite laws. A minimum duration is necessary; there is a limit of intensity below which no reaction occurs, and the effect is independent of temperature. These facts point to the occurrence of a photo-chemical reaction, whose products excite skin receptors.

"The direct action of ultra-violet light on micro-organisms and on tissue cells is a lethal or destructive one. The shorter the wave length, the more powerful the effect with equal energy of the radiation, probably owing to the greater absorption of the short waves by protoplasm.

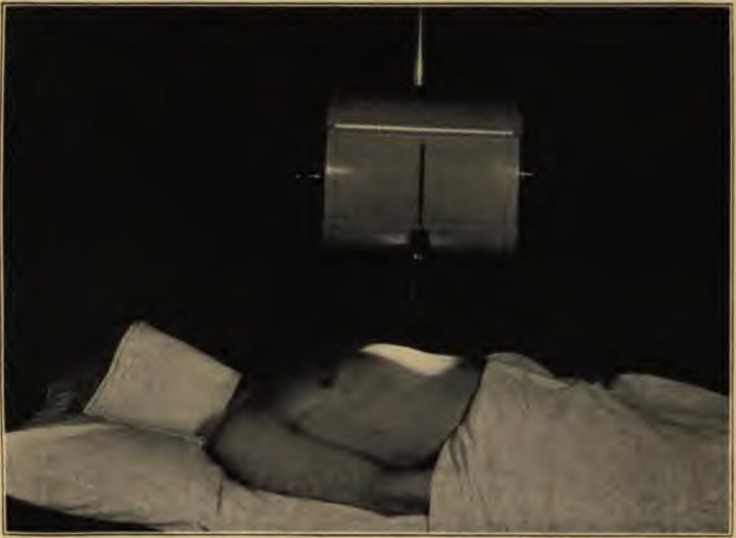
"Similar action can be produced by visible light in the presence of a dye which can absorb this light (photo-dynamic sensitisation).

"Application of the facts of photo-chemical reactions to the retinal process is suggested in the text.

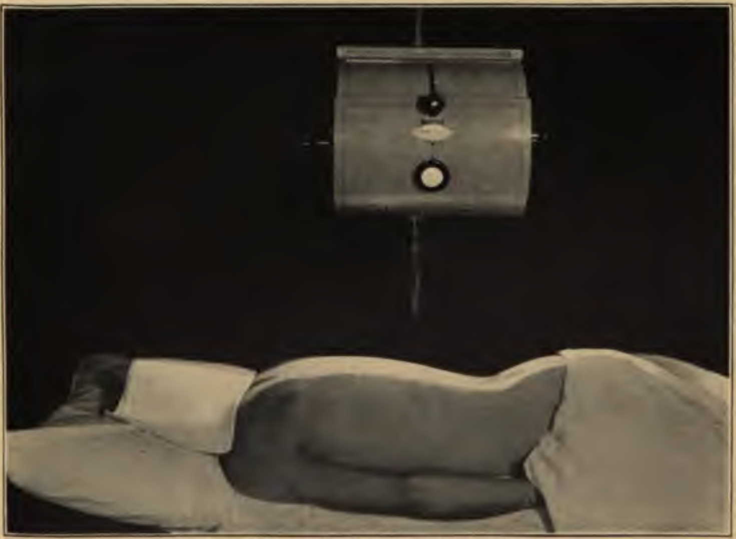
"Light causes changes of permeability in the cell membranes and, in plants, has been shown to have the effect of retarding growth.

"Certain animals adapt the color and pattern of their skin markings to suit the background against which they are seen. In the frog, the receptors for the reflex are situated in the toes and the eyes play no part. In the fish, the eyes are the receptors."

That actinic rays will cure X-ray burns is without question. That they will cure every case without question as to its age or severity is open to question, but that they will benefit every case is without doubt in the writer's mind, for we have taken burns which were eight years of age and obtained great benefit in a single treatment with a water-cooled mercury-quartz lamp. Recently we had a case of eight weeks' standing which was gradually growing worse, the area involved being about ten by fifteen *cm.* One-half the area healed in twenty-four hours after a one-minute treatment with a modern air-cooled mercury-quartz lamp, and the remaining portion closed in forty-eight hours after a second treatment of two minutes.



Showing treatment for gastric or duodenal ulcers.



Showing method of treating spine.

Plate XXIII

DIAGRAMMATIC SPECTRUM ANALYSIS

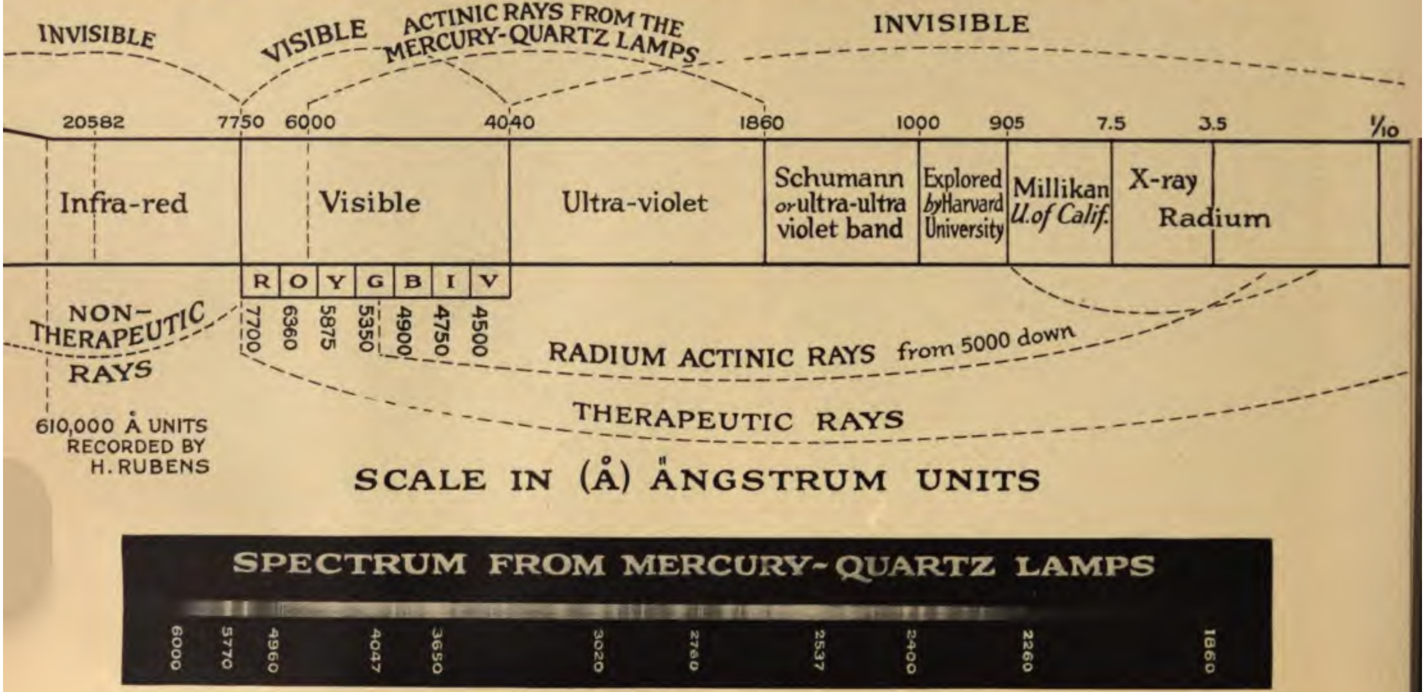

INVISIBLE
VISIBLE
ACTINIC RAYS FROM THE MERCURY-QUARTZ LAMPS
INVISIBLE
20582
7750
6000
4040
1860
1000
905
7.5
3.5
1/10
Infra-red
Visible
Ultra-violet
Schumann or ultra-ultra violet band
Explored by Harvard University
Millikan U. of Calif.
X-ray
Radium
R
O
Y
G
B
I
V
7700
6360
5875
5350
4900
4750
4500
NON-THERAPEUTIC RAYS
RADIUM ACTINIC RAYS from 5000 down
THERAPEUTIC RAYS
610,000 Å UNITS RECORDED BY H. RUBENS
SCALE IN (Å) ÅNGSTRUM UNITS
SPECTRUM FROM MERCURY-QUARTZ LAMPS
6000
5770
4960
4047
3650
3020
2760
2537
2400
2260
1860

Plate XXIII–A

We have made the statement repeatedly for years that a case which had received a full dose or course of doses of X-ray could be given a half dozen daily treatments of actinic rays and the X-ray treatments repeated and increased without danger of surface burns. Of this we are now certain: actinic ray treatments following X-ray treatments render the latter inocuous. The actinic-ray treatment should be long enough to produce a distinct hyperemia and blistering will do more good than harm, although it is unnecessary. About one minute at forty *cm*, with an air-cooled, modern, mercury-quartz lamp will do for the first treatment, increasing one minute daily up to ten minutes. With a modern water-cooled lamp one-fourth minute at five *cm* would be about right.

On page 43 we give our reasons for preceding each actinic-ray treatment with a radiant-light treatment. These reasons are well amplified by the experience of ourselves and others and we feel more than ever that a photo-therapy treatment is not giving the best results if carried out in any other way.

New photo-therapy apparatus is now on the market which bids fair to outstrip its predecessors in practical efficiency and even this is but the first step forward, for it is hoped that in the near future light can be so arranged that after the preliminary dilatation of the superficial vessels it may be possible to continue the radiant light while giving the actinic-ray treatment without decreasing its activity, the practical application of which will mean a wonderful advance in photo-therapy.

In 1918, while visiting in an Indiana city, we were asked to see a case of gastric ulcer which had been pronounced incurable. The patient had been vomiting for three months, and was badly emaciated and taking morphine constantly for his pain. We advised actinic rays and gave the first treatment of five minutes' duration and had the satisfaction of seeing him twenty-four hours later with very little pain and of hearing three months later that he had gained thirty-seven pounds and was back at work and the still greater satisfaction of recently hearing that he still remains well. Do you wonder that our enthusiasm for actinic rays grows with unabated fervor? It is hard indeed for words to convey an adequate idea of their value therapeutically.

All we have said regarding the use of actinic rays in the treatment of fistulas can be tripled or quadrupled. It is hard to praise them enough. With the added years of use we have nothing to retract from our former statements and with improved apparatus we are more enthusiastic than ever.

To the users of actinic-ray lamps who are not getting definite results we would urge that they have their lamps tested for actinic-ray efficiency before condemning either the lamps or actino-therapy. A good clinical test for actinic rays is to apply the lamp in contact with the integument of the upper arm for fifteen seconds. If the lamp is efficient this application should produce a distinct hyperemia. If the lamp is very efficient it may produce a blister but no harm will be done.

On page 91 we quote Case No. 355, Hodgkin's Disease, which came to us in October, 1917. This case is still with us and doing very well, in fact better than she has been for several years.

Her blood count is:

Erythrocytes	5,000,000
Hemoglobin	75%
Leucocytes	13,000
Neutrophiles	76%
Lymphocytes	3%
Mono-neuclears	7%
Eosinophiles	2%
Basophiles	2%
Transitional	9%

On page 115 we refer to Case No. 64, Splenomedullary Leukemia, who came to us in 1916 and is still working and supporting himself and wife.

His blood count is:

Erythrocytes	4,100,000
Hemoglobin	75%
Leucocytes	152,000

In September, 1916, his leucocyte count was 320,000.

Case No. 194, on page 62, remains well and is practicing medicine. There is no sign of recurrence and she is enjoying perfect health. The pelvis is soft and there is but a small scar.

Cases No. 168B, 354, 179, 247, 160, 114 also remain well with no sign of recurrence.

Case No. 345, Sarcoma. This patient remains well and plate No. VIII shows the present condition.

CHAPTER VI

QUESTIONS AND ANSWERS

1. *What preparation should precede a light treatment?*

   Remove all clothing from the area to be treated. If area is covered with crusts or discharges, they should be removed; dry sterile dressings are usually sufficient for redressing. Before treating pus cases use peroxide of hydrogen to cleanse the wound.

2. *What are the dangers of destruction of normal tissues of the body with actinic rays?*

   None, **except the epidermis,** if the time specified is not exceeded.

3. *Is the epidermis destroyed?*

   Yes—just as it is destroyed by sunlight.

4. *What treatment is necessary for the inflamed or blistered epidermis?*

   The 2000-candlepower lamp, at 60 cm. distance, for twenty minutes, followed by the application of olive oil or vaseline.

5. *How often should the treatments be repeated for acute diseases?*

   Daily.

6. *How often should the treatments be repeated for chronic diseases?*

   Daily until improvement begins and then less frequently.

7. *How long are the treatments?*

   This depends somewhat upon what one is trying to do. In some cases only the slightest hyperemia is required, while in others a thorough blistering is needed to produce results. From one to five minutes with the air-cooled or the water-cooled lamp for the early treatments; the later ones may be continued for from fifteen to fifty minutes.

8. *What is the difference in time between treatments given with the air-cooled lamp and the water-cooled lamp?*

   Given at the same distance, there would be very little difference; but with the water-cooled lamp one can give the treatments in contact or under pressure, while with the air-cooled lamp one must keep the lamp at a distance of 30 or more cm. to prevent heat burns.

9. *How can one keep account of the time during the treatments?*

   Use an interval-timer.

10. *Can all air-cooled actinic-ray lamps be used at the same distance from patient and for the same length of time?*

    No. Direct-current lamps do not throw as large a volume of rays as do alternating-current lamps, and 110-volt lamps throw a smaller volume than 220-volt lamps. For the average treatment, the alternating-current lamps should be used at one-third greater distance and for one-third less time than the direct-current lamps.

11. *Can all water-cooled actinic-ray lamps be used at the same distance and for the same length of time?*

    The answer is the same as for question No. 10.

12. *Is it necessary to protect the surrounding tissues for local treatments?*

    Not necessarily so, but in most cases desirable.

13. *Should one use the same protection for malignant and non-malignant growths?*

    No; for the malignant, ray the surrounding tissues well.

14. *How long will it take to produce a blister?*

    This depends largely upon the portion of the body being treated, the kind of lamp used, the distance of the lamp from the patient, and the susceptibility of the individual to actinic rays. Blonds blister more readily than brunettes. One minute with the water-cooled lamp in contact with the protected portions of the body will blister heavily, while three to five minutes will be required on the hands of one exposed to the weather. Three to five minutes will be required to produce a blister on the protected portions of the body with the air-cooled lamp at 60 cm. distance, while ten to fifteen minutes would be required to blister the hands.

15. *Do the actinic rays cause pain or discomfort during the treatments?*

    No; the patient does not feel anything during the ordinary treatment. The only exception to this is where the water-cooled lamp is used in contact for more than three minutes, when a burning sensation is experienced.

16. *How soon after treatment does the patient experience discomfort?*

    Following heavy treatments, in from one to five hours; reaction at its height, in from twelve to twenty-four hours.

17. *How long does it take the patient to recover from the reaction?*

    From three to ten days.

18. *What about the reaction from subsequent rayings after the skin has become tanned by ten or more treatments?*

    It takes longer exposures and shorter distances to produce the same reaction.

19. *Is a heavy reaction ever desirable?*

    Yes, in some cases, and particularly for chronic local diseases.

20. *Would it be desirable to produce a heavy reaction in chronic constitutional disorders?*

    Not as a rule, because such a reaction may produce chills, followed by a sharp rise in temperature, prostration, a general sense of illness, nausea, and perhaps vomiting, also a loss of will-power, from which it may take several days to recover. On the other hand, short treatments have a general tonic effect on the nervous system, producing increased appetite and strength, quiet, restful sleep, and a general sense of well-being.

21. *How is one to avoid a heavy reaction?*

By starting the treatments cautiously—one minute with the air-cooled lamp at 60 cm. distance, increasing the time one minute each subsequent day, and decreasing the distance 3 cm. daily until improvement begins, or until fifteen-minute treatments are being given at 30 cm. distance.

22. *Is it ever necessary to go beyond the above time and distance?*

Seldom, except for chronic local diseases such as malignancies, lupus, etc., when one blisters heavily with a water-cooled lamp.

23. *How long may one use the water-cooled lamp in contact without doing damage to normal tissues?*

The exact time has not been determined, but the author has given fifty minutes in contact—without a filter—without destruction below the epidermis. This was in a case where many treatments had been given. Ten minutes or less is usually sufficient.

24. *At what distance are the treatments given?*

Usually start at about 70 cm. for the air-cooled lamp, decreasing the distance about 3 cm. daily as the skin becomes tanned—more slowly for blonds than for brunettes.

25. *What is the length of time required for treatments?*

Usually one minute for the first treatment and increased one minute each day until the patient improves or until a period of fifteen minutes is reached.

26. *What is the frequency of the treatments?*

Daily until improvement is marked, then thrice, twice, or once weekly. Use physical methods of sufficient dosage and of sufficient frequency to start and keep the patient constantly improving as one would with drugs.

27. *Over what period of time should treatments be given?*

For several treatments after the patient is apparently well.

28. *Is it necessary for the operator to protect his eyes or hands while giving these treatments?*

No, if he will keep out of the rays as much as possible.

29. *What should be the position of the patient with regard to the lamp?*

The rays must strike the surface of the body at right angles.

30. *If only one of the two lamps could be purchased, which would be preferable?*

This would depend upon the class of work being done. For general body treatments and constitutional disorders, the air-cooled lamp; for local or cavity treatments, the water-cooled lamp.

31. *Why is the water-cooled lamp better for local or cavity treatments?*

It is difficult to localize the air-cooled lamp, and when localized there is too much time consumed, as the length of treatment must be in direct ratio to the distance of the patient from the lamp.

32. *Is local anemia desirable in treating diseased conditions with actinic rays?*

In a very few instances it may be; usually it is not.

33. *In treating surface conditions which applicator should be used?*

The one best suited to the lesion. This statement seems rather indefinite, but it contains the facts. If possible use the rays direct without any filter and without the solid-quartz applicators.

34. *When should the solid-quartz applicators be used?*

When the rays are to be intensified or the tissue compressed; otherwise seldom, though they may be used as a reducer.

35. *How should small areas be treated?*

By cutting a hole in Z. O. adhesive plaster a trifle larger than the area to be treated and applying this to the skin.

36. *When should the blue-quartz filters be used?*

When prolonged deep action is desired. We prefer the shorter, more intense treatments without them and believe we get better results.

37. *Would it be advisable to have the air- and the water-cooled lamps on the same standard?*

No, because they are clumsy and because one can just as easily use both at the same time, treating two cases instead of one.

38. *What diseased conditions require blistering?*

Tubercular (local lesions), eczema, nævi, acne, local sepsis, as abscesses, carbuncles, etc.

39. *Can malignant diseases be cured with the actinic rays?*

Absolutely, no! However, some splendid results have been obtained when they are used as a follow-up treatment for deep malignancies after removal of all extraneous growths by the cautery method of Dr. J. F. Percy of Galesburg, Ill., or by the electro-coagulation method of Dr. W. L. Clark of Philadelphia, Pa.

40. *Can all diseases be treated with actinic rays?*

See alphabetical list of diseases on page 156-165.

41. *Will the mucous membranes stand as much raying as the skin¿*

Yes, more, the ratio being about three to one.

42. *How can cavities be treated with the water-cooled lamp?*

By the use of ordinary specula or through special ones designed for particular purposes.

43. *What is the frequency of the cavity treatments with the water-cooled lamp?*

Usually every second or third day, but treatments may be given every day in special cases.

44. *What is the length of time required for the treatment of mucous membranes?*

From two minutes in the throat or nose to ten minutes in the vagina or rectum. They are usually given in contact, or nearly so, and may be given under compression.

45. *In giving local treatments should one give a general raying at the same time?*

Yes, if the disease has produced any general symptoms and especially if metabolism is poor.

46. *In giving a general raying how much of the body should be exposed?*

Not less than the entire torso, and in many cases it is advisable to ray the limbs as well. Occasionally a heavy raying of the soles of the feet is decidedly beneficial.

47. *What effect do the actinic rays have on the blood stream?*

They increase the erythrocytes and normalize the leucocytes.

48. *How soon should results be expected in chronic cases?*

Within ten days. In acute cases in a few hours, and, occasionally, in minutes.

49. *Are the actinic rays readily obstructed?*

Yes; by everything except quartz, fluorspar, and water. Even a pocket handkerchief will obstruct them.

50. *Will glass or mica obstruct them?*

Yes.

51. *How can deeply placed diseased tissues be treated with actinic rays?*

Deep tissues can be reached through the blood stream. Finsen was the first to demonstrate that the blood stream absorbs most of these rays, since which time many others have confirmed his statement.

52. *Can the 2000-candlepower lamp and actinic rays be used simultaneously?*
We think not, as they seem to neutralize each other.

53. *What will help to minimize the burning following actinic-ray treatments?*
The best method is to ray with the 2000-candlepower lamp.

54. *What is the next best method?*
Cover the surface with vaseline or olive oil.

55. *Will actinic rays cause permanent injury to the eyes?*
No. Exceptions are cases of diabetes or where there are opacities.

56. *Are the rays of use in treating cataracts?*
No; they probably would be injurious.

57. *What temporary injury to the eyes will actinic rays cause?*
A severe conjunctivitis.

58. *What should be done for actinic-ray conjunctivitis?*
Apply pure castor oil to the cornea and conjunctiva and keep the patient in a dark room.

59. *How long will it take the patient to recover?*
About three days.

60. *Can any harm come from long-continued actinic-ray treatments?*
Not unless heavy reactions are produced. We have given them daily for months with constant improvement. It is possible to do harm, but not probable.

61. *What would be the effect on a person if he were to stay indefinitely under one of these lamps?*
One person slept under the air-cooled lamp for one hour.

She was badly burned and without will-power for about three days; otherwise she was in no way harmed.

62. *How long will the skin remain tanned where treatment has been given for several months?*

The disappearance is a little slower than when sun-tanned.

63. *Will the actinic rays destroy in the same sense that the X-rays and radium destroy?*

No; on the contrary, actinic rays are constructive and beneficial in many cases of X-ray and radium burns.

64. *Will actinic rays benefit tissues damaged by X-rays?*

Yes; after which larger doses of X-rays can be given.

65. *How should the scars from X-ray burns and the telangiactasis following be treated?*

Blister thoroughly and repeat as soon as the skin exfoliates.

66. *Should one explain to patients that a burn may be produced?*

Yes, by all means; otherwise they will become unduly alarmed when the hyperemia begins.

67. *Can actinic rays from the air-cooled lamp be thrown into cavities?*

Yes, with good results, but the technique is much more difficult.

68. *What substances will actinic rays fluoresce?*

Living cells and willemite.

69. *Have the actinic rays an affinity for oxygen?*

They have, and herein lies much of their value.

70. *Will actinic rays penetrate living tissue?*

Yes; see Plate I (on page 16), showing penetration through the hand, chest, and abdomen.

71. *How should a general treatment be given?*
First ray torso with a 2000-candlepower lamp for ten minutes, following this with the actinic rays.

72. *For what purpose is the 2000-candlepower lamp used?*
To dilate the capillaries and bring the blood to the surface.

73. *Will the 2000-candlepower radiant lamp produce actinic rays?*
No; they will not penetrate glass.

74. *Can these rays be used for coryza?*
Yes, in conjunction with radiant light.

75. *How should a case of gastric ulcer be treated?*
By giving a twenty-minute treatment with the radiant light, followed by actinic rays, using the air-cooled lamp at a distance of 50 cm. for three minutes, gradually reducing the distance and lengthening the time up to ten or fifteen minutes. (See case reports.)

76. *Will the actinic rays lower blood pressure?*
Yes, as the general condition of the patient improves, although we seldom depend upon the rays alone, but use them in conjunction with autocondensation.

77. *Will the rays help insomnia?*
Yes.

78. *Will these rays benefit neurasthenic conditions?*
Yes.

79. *What results may be expected in Pott's disease?*
Good—the best single method we possess.

80. *How can a prostate gland be rayed?*
Through a proctoscope.

81. *How should a posterior urethritis be treated?*
Through a proctoscope.

82. *How should a case of cystitis be treated?*

Through the vagina or rectum and over the pubes.

83. *Will actinic rays increase elimination?*

Yes. Urinary analyses show that the quantity of uric acid and creatinin eliminated is increased (200 and 76 per cent, respectively).

84. *Will actinic rays help tuberculosis in all its forms?*

Yes; they are the best single remedy we have, when used with other recognized methods, such as sunlight, good food, fresh air, hydrotherapy, etc. Rest is not so important an adjunct (except in high temperatures), and the patient will usually be better off if permitted to occupy his mind and exercise his muscles.

85. *Will actinic rays increase the tubercular temperature?*

Not if used cautiously. Heavy raying will produce a temperature in any patient.

86. *How should actinic rays be used in treating a case of pulmonary tuberculosis?*

Begin by raying the torso for ten minutes with a 2000-candlepower radiant lamp, followed by a one-minute treatment with the air-cooled lamp at a distance of 60 cm. Treat daily until there has been decided improvement, then twice or thrice weekly. Increase the time one minute each treatment until ten or fifteen minutes is reached, and meanwhile reduce the distance 3 cm. daily. Bone, gland, and peritoneal tuberculosis are similarly treated.

87. *Will the actinic-ray treatment improve tubercular joints that are fixed or nearly so?*

Yes; following the relief of pain and swelling comes improved joint movement.

88. *Is this not contrary to surgical treatment where ankylosis is the thing desired?*

Yes, and in most cases actinic rays alone are better than surgery alone. Use both.

89. *How should a tubercular larynx be treated?*
Principally through the outside. Cross-fire the larynx and give general body treatments.

90. *How should a tubercular throat be treated?*
Through the mouth and by general treatments.

91. *How would you treat eczema?*
Blister it; meanwhile remove the etiological factor if possible.

92. *Will actinic rays cure blepharitis?*
We have not used them for this disease, but believe they would be beneficial.

93. *Are the actinic rays of use in high-blood-pressure cases, especially when accompanied by nephritis?*
Yes, one of the best methods. Give general body raying, and in conjunction we use autocondensation for ten minutes.

94. *Are actinic rays soothing?*
Yes—if not sufficient to blister. Patients will frequently go to sleep while taking their treatments.

95. *Are violet and ultra-violet rays the same?*
No. What are commonly called violet rays are produced by a high-frequency current and a vacuum tube, the color depending upon the degree of vacuity. Ultra-violet indicates invisible rays located just below the violet in the spectrum, while the ultra-ultra violet are still further removed from violet and are known as the Schumann band of the spectrum.

96. *Are actinic and ultra-violet rays the same?*
Yes and no. Actinic rays are chemical rays and to some extent are developed in the violet portion of the spec-

trum, although the greater number are produced in the ultra-violet region.

97. *Are the sun's rays and actinic rays the same?*

No; the sun gives all the rays of the spectrum, including the infra-red and the ultra-violet; from the violet and the ultra-violet bands actinic rays are given off. The quartz lamp gives very few rays except the actinic.

98. *Will the air-cooled lamp produce ozone in sufficient quantity to be remedial?*

Probably so, but proof is not available.

99. *If a patient should discontinue taking actinic-ray treatments for two weeks or more, could treatments be resumed for the same period of time of the former treatments?*

No; the treatments must be started as with a new case.

100. **Start your cases cautiously. Treat them boldly.**

CHAPTER VII

TABLE OF DISEASES

GLOSSARY

"A. C. L." means "air-cooled lamp."

"W. C. L." means "water-cooled lamp."

"Time" is given in minutes.

"Distance" gives the number of inches the lamp should be from the patient.

Frequency: "D" means "daily."
"W" means "weekly."
"2/W" means "twice weekly."
"3/W" means "thrice weekly."

"Radiant light" means a 2000-candlepower lamp. The distance of the lamp from the patient is not given, as it varies with each patient and should be just far enough away to be comfortable. If too close it produces a nervous irritability. Where radiant light is used it should precede the actinic-ray treatment.

"Remarks" are self-explanatory.

"L." means "local."

"G." means "general" or body treatment.

"C." means "contact."

"Spec." means "speculum."

When both actinic-ray lamps are quoted for one disease, either may be used or the water-cooled lamp for local treatment and the air-cooled lamp for general treatment of the same case.

In the following table the author has endeavored to give the maximum and minimum of time and distance for each lamp and for each separate disease. This table is intended for a guide; experience alone will teach you the exact amount needed.

GENERAL TREATMENTS

Start the treatments with radiant light over torso for ten to twenty minutes and then use the air-cooled lamp for one minute and increase one minute per day. The lamp should be about twenty-four inches from the patient for the first treatment and this distance decreased about two inches daily until treatments of ten or fifteen minutes are given at a distance of ten inches. If these directions are followed, few blisters will be produced.

Actinic rays are auxiliary to all other recognized methods of treatment, although in many cases they alone are sufficient.

THE following table—pages 170 to 179, inclusive—is to be used for the Hanovia Lamps

DISEASE	RADIANT LIGHT	ACTINIC RAYS				FREQUENCY	REMARKS
		Time, Minutes		Distance, Inches			
	Minutes	A.C.L.	W.C.L.	A.C.L.	W.C.L.		
Abscess	10	1–10	1–5	20–3	1–C	D	Drain first. L.
Acne	20	5–20	1–3	20–5	2–1	3/W	Open pustules. L. & G.
Adenoma	20	5–30	1–30	20–5	1–C	D–3/W	Usually blister. L. & G.
Adenitis (T. B.)	20	5–20	1–30	20–2	3–C	D–W	Blister heavily. L. & G.
Adhesions (all kinds)	20	1–10	....	24–10	....	D–3/W	To aid absorption. G.
Alopecia		20–40	1–10	8	3–1	W	Blister heavily. L.
Alcoholism		5–10	....	20–10	....	2/W	Blister. G.
Anemia	10	1–10	....	20–12	....	D	Do not blister. G.
Angioma		....	5–30	.....	C	W	Blister heavily. L.
Anthrax	20	1–10	2–40	20–10	3–C	D	Blister heavily. L. & G.
Ankylosis	20	1–15	2–10	20–10	2–C	3/W	Do not blister. L. & G.
Amenorrhea	10	1–15	....	20–10	....	2/W	Do not blister. G.
Appendicitis	30	1–15	1–5	20–10	C	D	Do not blister. L. & G.
Arthritis	20	1–10	....	20–10	....	D	Do not blister. G.
Asthma	20	1–10	....	20–10	....	D–3/W	Do not blister. G.
Autointoxication	20	1–15	....	20–10	....	D–3/W	Do not blister. Clean out the colon. G.
Arteriosclerosis	20	1–10	....	20–10	....	3/W	To increase general vitality. G.

Bartholinitis........	....	1–5	.....	1–C	D	Avoid blistering. L.
Blood pressure....10	1–15	....	20–10	....	D–2/W	See Nephritis. G.
Boils.............10	1–10	1–5	20–12	2–C	D	Blister (see Furunculosis). L.
Bronchitis........20	1–10	....	20–12	....	D	Do not blister. G.
Burns............20	1–10	....	20–10	....	D	Do not blister. L. & G.
Bursitis...........20	1–10	1–10	20–10	2–C	D	Blister. L.
Bubo...............	....	1–5	.....	1–C	D	Blister lightly. L.
Bunions............	....	1–10	.....	1–C	2/W	Blister. L.
Carcinoma (all locations)...20	1–15	1–45	20–12	2–C	D	Where possible, cauterize, electrocoagulate, or fulgurate first. L. & G.
Carbuncle..........	....	1–15	.....	2–C	D	Have free drainage. L.
Catarrh (nasal)......	....	....	.....	....	.....	See Hypertrophied Turbinates. L.
Cervicitis...........	1–10	....	.....	Spec.	3/W	L.
Cellulitis (pelvic)...20	1–10	5–10	20–12	Spec.	D–3/W	Drain abscess. L. & G.
Cellulitis (surface).20	2–15	2–5	10–6	2	D	Drain abscess. L. & G.
Cholecystitis......30	1–10	....	20–12	....	D	For infections without calculi. L. & G.
Chorea...........20	1–10	....	20–12	....	D	Correct local conditions. G.
Chlorosis.........20	1–10	....	20–12	....	D	Persistence means success. G.
Chilblains.........20	....	1–5	.....	1–C	D	Produce erythema. L.
Chancroid..........	....	2–5	.....	1	D	Will not cure chancre. L.

DISEASE	RADIANT LIGHT Minutes	ACTINIC RAYS				FREQUENCY	REMARKS
		Time, Minutes		Distance, Inches			
		A.C.L.	W.C.L.	A.C.L.	W.C.L.		
Colitis	30	1–10	....	20–12	....	D–2/W	Keep colon clean. G.
Constipation	20	1–10	....	20–12	....	3/W	Use vibration. G.
Contagious diseases	....	....	....	.....	....	.....	All are considered amenable, but they require hospital treatment. L. & G.
Cutaneous T. B.	....	....	....	.....	....	.....	See Lupus. L.
Cystoadenoma	20	....	1–45	.....	C	1–2/W	Blister heavily. L.
Cysts (local)	....	....	1–10	.....	C	1/W	Drain. Produce a benign inflammation. L.
Cystitis	20	1–10	1–10	20–10	Spec.	2/W	Through vagina or rectum. L. & G.
Dermatitis herp.	....	5–10	....	14–8	....	3/W	Blister. L.
Diabetes mellitis	20	1–10	....	20–10	....	D	Diabetic diet. G.
Duodenal ulcer	20	1–15	1–5	20–10	C	D	Non-acid diet. L. & G.
Ductless-gland diseases	20	2–10	....	20–10	....	D–2/W	Continue for several months. G.
Dysmenorrhea	20	2–10	....	20–10	....	D	Four days before period. G.
Dyspepsia	20	1–10	....	20–10	....	D	See Gastritis. Make better diagnosis.

Dysentery........30	1–15	....	20–8	....	D	Blister lightly. G.
Eczema (all varieties).......20	5–10	1–5	16–8	5–1	3/W	Correct diet. No aqueous applications. L. & G.
Empyema 30	1–15	....	20–10	....	D	Drain if necessary. G.
Enterocolitis........	....	....	.....	....	.....	See Colitis. G.
Enuresis..........20	1–10	....	20–10	....	D	Ray heavily but short of blistering. G.
Epithelioma.........	....	1–20	.....	1–C	D–2/W	Cauterize. L.
Epididymitis......20	1–3	....	.....	1–C	D	Do not blister. L.
Erosion of cervix.....	....	4–10	.....	Spec.	3/W	Blister slightly. L.
Erythemia..........	1–10	....	20–10	....	D–2/W	May have to blister. G.
Erysipelas.........30	5–20	1–5	15–5	2–1	2/D	Blister. L. & G.
Fatigue...........20	1–10	....	20–10	....	D	Do not blister. G.
Favus..............	....	5–10	.....	2–C	3/W	Blister. L.
Felon............20	....	1–5	.....	1	D	Drain. L.
Folliculitis........20	1–10	1–5	20–10	2–1	D	Blister. G.
Furunculosis......10	1–10	1–5	10–5	2–1	3/W	Drain. L.
Gangrene.......20–40	1–10	1–10	20	2–C	D	Stimulate heavily. L. & G.
Gastric ulcer......20	1–15	1–5	20–8	C	D	Must be persisted in. G.
Gastralgia..........	....	....	.....	....	.....	See Gastric Ulcer. G.
Gastritis............	....	....	.....	....	.....	See Gastric Ulcer. G.

DISEASE	RADIANT LIGHT Minutes	ACTINIC RAYS Time, Minutes		ACTINIC RAYS Distance, Inches		FREQUENCY	REMARKS
		A.C.L.	W.C.L.	A.C.L.	W.C.L.		
Gleet		....	5–10	.....	Spec.	D–2/W	Through rectum. L.
Gout	30	1–15	1–5	30–10	3	D	Colchicine gr. 1/100. L.
Goiter		....	1–10	.....	5–C	2/W	L.
Gonorrhea	20	1–10	1–10	20–10	2–1	D	Expose mucous membranes as much as possible. L.&G.
Gonorrheal arthritis	20	1–10	....	20–6	....	D	Produce erythema. L.
Granulation tissue	10	1–5	1–4	16	4–2	D–2/W	Do not blister. L.
Gunshot wounds	20–60	1–15	1–5	40–4	8–4	D	Prolonged distant radiation. G.
Hay Fever	20	1–10	2–4	20–10	1–C	D–3/W	Mostly through nose. L.
Hepatitis	20	1–10	....	20–10	....	D	Avoid blistering. G.
Heart diseases	20	1–10	....	40–10	....	D	Usually infective etiology. G.
Hemangioma	20	1–15	2–50	20–8	4–C	D	See Sarcoma. L. & G.
Herpes progenitalis		4–8	1–4	20–8	2–1	D	Blister. L.
Herpes zoster		5–10	1–5	20–8	2–1	D	Blister heavily. L. & G.
Hemorrhoids		....	1–10	.....	1–C	2/W	Avoid blistering. L.
Hysteria		1–10	....	30–15	....	D	To sedate. G.
Ichthyosis	30	10–20	....	15–8	....	D	Blister heavily. G.
Infections	20	1–10	1–5	20–2	5–C	D	Blister severely. L. & G.

Injury	30	1–10	1–3	20–10	4–1	D	After surgery. L. & G.
Insomnia	20	1–10	....	20–10	....	D	Slight erythema. G.
Impetigo-contagioso	....	5–10	2–5	15–5	3–1	D	Blister heavily. L. & G.
Ischio-rectal abscess	....	....	1–5	.....	1–C	D	Drain. Avoid blistering. L.
Keloid	....	....	2–20	.....	C	D–W	Blister heavily. L.
Laryngitis (acute)	30	1–5	....	20–10	....	D	Do not blister. L.
Laryngitis (chronic)	30	1–10	2–10	10–2	2–C	3/W	Blister. L.
Leukemia, splenomedullary	10	1–15	....	20–8	....	D	Do not blister. G.
Leucorrhea	....	....	5–10	.....	Spec.	3/W	Make proper diagnosis. L.
Lichen simp.	....	5–10	....	15–10	....	3/W	Blister slightly. G.
Lichen planus	....	1–10	1–5	15–10	2	3/W	Blister slightly. G.
Lupus ery. or vulg.	....	1–10	2–15	20–10	4–1	2/W	Blister heavily. L. & G.
Lumbago	30	5–10	1–3	20–10	2–C	D	Produce erythema. L. & G.
Lymphangitis	30	5–15	1–5	15–5	4–2	2/D	Rapid results are necessary. L. & G.
Marasmus	20	1–10	....	30–10	....	.....	For stimulation. G.
Nævi (all kinds)	....	....	5–30	.....	1–C	W	Blister heavily. L.
Neisserian	....	....	....	.....	....	.....	See Gonorrhea. L. & G.
Nephritis	20	1–10	....	20–10	....	D	Avoid blistering. Use auto-condensation. G.

DISEASE	RADIANT LIGHT Min-utes	ACTINIC RAYS Time, Minutes		Distance, Inches		FREQUENCY	REMARKS
		A.C.L.	W.C.L.	A.C.L.	W.C.L.		
Neuralgia	30	1–15	1–5	20–6	1–C	D–3/W	L. & G.
Neurasthenia	20	1–10	....	20–10	....	D	Do not blister. G.
Neuritis	20	1–10	1–5	15–6	2–C	D	Blister if need be. L. & G.
Onychia	15	1–10	1–5	10–5	1–C	D–3/W	Blister slightly. L.
Orchitis	20	....	1–5	.....	1–C	D	Support. L.
Osteomyelitis	30	1–15	1–20	20–6	5–C	D	After drainage. L. & G.
Ovaritis	20	1–10	5–10	20–10	Spec.	D–3/W	Mag. sul. tampons. L. & G.
Ozena		....	1–4	.....	1–C	D–3/W	After scabs are removed. L.
Pancreatitis		1–15	....	20–10	....	D	Heavy treatments. G.
Periostitis	10	5–10	1–15	10–2	1–C	D	Open abscess. L. & G.
Pelvic cellulitis		....	....	.....	....	.....	See Cellulitis.
Phlegmasia alba dolens	30	1–10	....	24–10	....	D	Avoid blistering. G.
Pharyngitis		1–5	1–3	6	1	D	Through mouth. L.
Phlebitis	30	1–10	1–5	20–10	3–1	D	Elevate. L. & G.
Pott's Disease	30	1–20	1–10	20–10	4–C	D–1/W	Surgery if necessary. L. & G.
Prostatitis		....	2–10	.....	Spec.	D–2/W	Use massage. L.
Prostatic hyper.		....	....	.....	....	.....	See Prostatitis. L.
Proctitis		....	1–10	.....	Spec.	D–2/W	Astringents. L.

Pruritis ani.........		4–10	1–5	10–5	4–1	3/W	Study etiology. L. & G.
Pruritis vulvæ		4–10	1–5	10–5	4–1	3/W	General treatments for etiology. L. & G.
Psoriasis............		5–15	....	15–5	....	D–2/W	Autotherapy. G.
Pyosalpinx........	20	1–10	5–10	20–10	Spec.	D–2/W	Surgery if indicated. L. & G.
Pyonephrosis........		1–10	....	20–10	....	D	Surgery if indicated. G.
Rheumatism......	30	1–15	....	20–6	....	D	Study etiology. G.
Rheumatism (gonorrheal)	45	1–15	1–10	20–2	4–C	D	Heavy local treatments. L. & G.
Rhinitis atrophic ..	20	....	1–5	.....	1-C	3/W	Through nose. L.
Rhinitis hyper.....	20	....	1–5	.....	1-C	3/W	Through nose. L.
Rhinophyma........		....	5–10	.....	1–C	2/W	Blister heavily. L.
Rhinoscleroma.....	20	....	5–30	.....	1–C	3/W	Blister very heavily. L.
Rosacea..........	20	3–6	1–3	12–6	2–1	3/W	Blister. L.
Salpingitis........	20	....	5–10	.....	Spec.	D	Pos. galvanism. L.
Sarcoma..........	10	1–15	5–50	20–8	5–C	D	Cauterize first. L. & G.
Sciatica...........	30	1–10	1–4	20–10	5–1	D	Study etiology. L. & G.
Scrofulosis T. B......		....	....	.....	....	.....	See Adenitis. L.
Seborrhea.........	20	1–10	1–5	15–8	3–1	3/W	Blister. L.
Septicemia........	30	1–15	1–5	20–8	2–C	D	After surgery. L. & G.
Sinus infection	45	1–10	1–3	20–10	1–C	D	Maintain drainage. L. & G.
Sigmoiditis..........		....	....	.....	....	.....	See Colitis. L.

DISEASE	RADIANT LIGHT	ACTINIC RAYS				FREQUENCY	REMARKS
		Time, Minutes		Distance, Inches			
	Minutes	A.C.L.	W.C.L.	A.C.L.	W.C.L.		
Syphilis............		....	....	.....	....	.....	Slight aid only. L. & G.
Sycosis.............		5–15	2–5	10–5	1–C	3/W	Clip hair. L.
Synovitis...........		1–10	1–5	20–10	1–C	D–W	Persist. L.
Telangiectasis.......		....	3–20	.....	2–C	W	Must blister heavily. L.
Tetanus............		5–20	2–10	10–5	2–C	2/D	Blister area, then give general treatment. L. & G.
Tendosynovitis ...	20	5–10	1–10	20–6	2–C	D	Must blister heavily. L.
Tinæ (all varieties) ..		5–20	2–10	10–2	2–C	D	Blister heavily. L.
Tonsilitis...........		....	1–4	.....	1–C	D	Through mouth. L.
Tonsils hyper.		....	2–5	.....	1–C	2/W	Clean out infection. L.
Tuberculosis—							
1. Bone and joints.	20	1–10	1–5	20–10	5–1	D	Surgery when needed. L.& G.
2. Glands........	10	1–10	1–10	20–2	2–C	D–2/W	Lance abscess. L. & G.
3. Peritoneal.....	30	1–20	....	20–8	....	D–2/W	Paracentesis if necessary. G.
4. Pulmonary....	20	1–15	....	20–8	....	D–2/W	Plus recognized treatment. L. & G.
5. Rectum.......	20	1–20	2–10	20–10	Spec.	D	L. & G.
6. Skin..........	20	1–30	1–30	10–2	4–C	2/W	Use no ointment. L.
Turbinates hyper. ...		....	1–5	.....	1–C	2/W	Through nostril. L.

Ulcers—						
1. Chancroid.......	....	....	.....	....	.....	See Chancroid. L. & G.
2. Duodenal........	....	....	.....	....	.....	See Duodenal. L. & G.
3. Gastric..........	....	....	.....	....	.....	See Gastric. L. & G.
4. Tubercular......	....	....	.....	....	.....	See Adenitis. L. & G.
5. Malignant.......	....	....	.....	....	.....	Use cautery or electrocoagulation. L. & G.
6. Syphilis.........	....	....	.....	....	.....	To increase local or general vitality. L. & G.
7. Varicose.........	....	....	.....	....	.....	See Varicose ulcers. L. & G.
Urticaria..........20	5–15	....	20–8	....	D	Use salines. G.
Urethritis...........	....	....	.....	....	.....	See Gonorrhea. L.
Varicose ulcers 20	2–10	1–5	20–10	1–C	D–W	Protect from irritation. L. & G.
Vaginitis............	2–10	5–10	.....	Spec.	D	Mild antiseptics. L.
Vesiculitis..........	....	5–10	.....	Spec.	D	Through rectum. L.
Whooping cough...20	1–10	....	20–10	....	D	Zone therapy. G.
Wounds..........30	5–10	1–15	20–6	1–C	D	Dress aseptically. L. & G.

CHAPTER VIII

TABLE OF DISEASES

GLOSSARY

"A. C. L." means "air-cooled lamp."

"W. C. L." means "water-cooled lamp."

"Time" is given in minutes.

"Distance" gives the number of inches the lamps should be from the patient.

Frequency: "D" means "daily."
"W" means "weekly."
"2/W" means "twice weekly."
"3/W" means "thrice weekly."

"Radiant light" means a 1500-watt lamp.

The distance of the lamp from the patient is not given, as it varies with each patient and should be just far enough away to be comfortable. If too close it produces a nervous irritability. Where radiant light is used it should precede the actinic-ray treatment.

"Remarks" are self-explanatory.

"L" means "local."

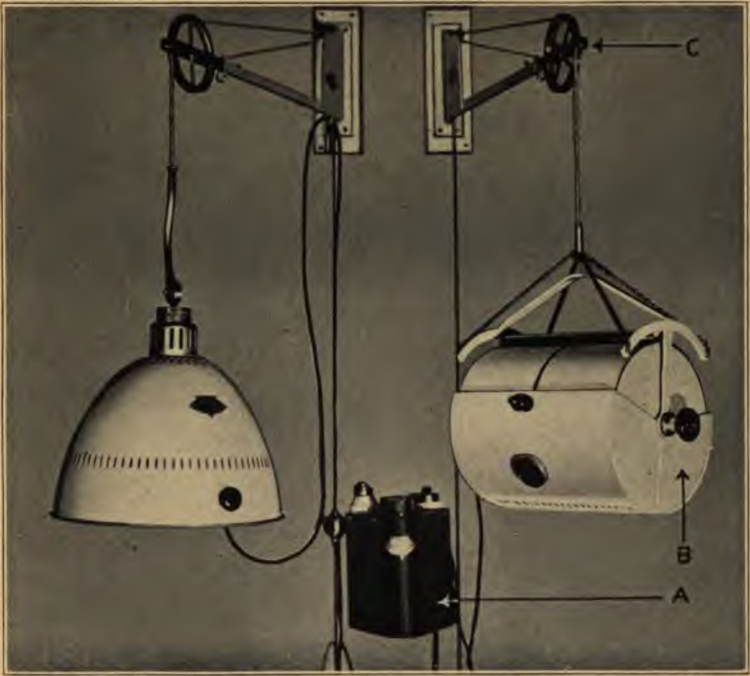
"G" means "general" or body treatment.

"C" means "contact."

"Spec." means "speculum."

When both actinic-ray lamps are quoted for one disease, either may be used or the water-cooled lamp for local treatment and the air-cooled lamp for general treatment of the same case.

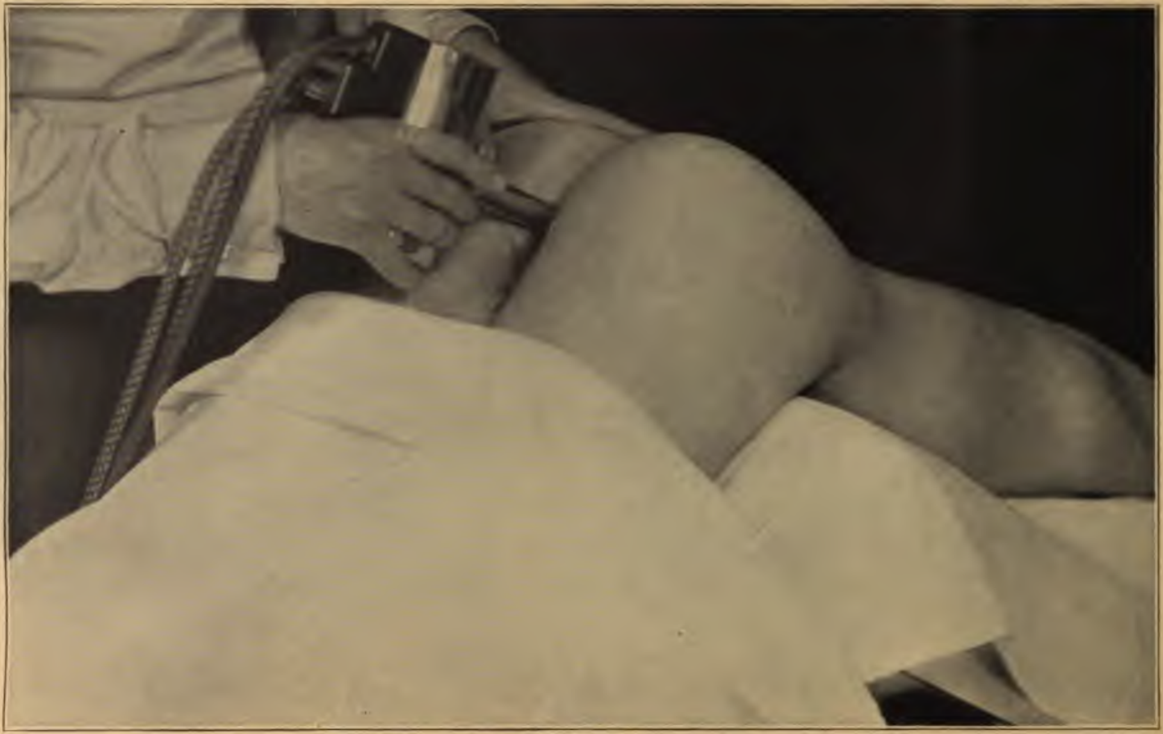
In the following table the author has endeavored to give the maximum and minimum of time and distance for each lamp and for each separate disease. This table is intended for a guide; experience alone will teach you the exact amount needed.



Showing best method of hanging radiant and air-cooled lamps.

Water-cooled lamp used for compression treatments.

Plate XXIV



Showing method of treating sigmoid and rectum.

Plate XXV

GENERAL TREATMENTS

Start the treatments with radiant light, using a 1500-watt bulb over torso for from ten to twenty minutes both front and back. Then use the air-cooled mercury-quartz lamp for one-half minute, increasing one-half minute daily until treatments of eight or ten minutes are being given. The air-cooled lamp should be about thirty inches from the patient for the first treatment. Decrease this distance about two inches daily for five days, then keep the lamp at about eighteen inches from the patient for all following treatments.

For patients sensitive to actinic rays it may be necessary to keep the lamp at a distance of at least twenty-four inches. Remember always that blondes blister more easily than brunettes.

My former advice to take the first treatment given with the lamp still holds good. Try it and find out why.

Actinic rays are auxiliary to all other recognized methods of treatment, although in many cases they alone are sufficient.

The following table is to be used with the Burdick lamps

The table following is to be used with the Burdick lamps

DISEASE	RADIANT LIGHT	ACTINIC RAYS				FREQUENCY	REMARKS
	Min-utes	Time, Minutes A.C.L.	Time, Minutes W.C.L.	Distance, Inches A.C.L.	Distance, Inches W.C.L.		
Abscess	10	1–10	¼–3	30–5	1–C	D	Drain first. L.
Acne	20	2–10	¼–2	30–10	2–1	3/W	Open pustules. L. & G.
Adenoma	20	2–20	½–5	30–10	1–C	D–3/W	Usually blister. L. & G.
Adenitis (T. B.)	20	2–10	½–3	30–5	2–C	D–W	Blister heavily. L. & G.
Adhesions (all kinds)	20	½–5	.....	30–10	....	D–3/W	To aid absorption. G.
Alopecia		3–10	½–5	10	2	W	Blister heavily. L.
Alcoholism	20	½–5	.....	30–15	....	2/W	Blister G.
Anemia	10	½–5	.....	30–15	....	D	Do not blister. G.
Angioma		.....	1–5	.....	C	W	Blister heavily. L.
Anthrax	20	½–10	¼–10	30–15	3–C	D	Blister heavily. L. & G.
Ankylosis	20	½–5	¼–3	30–15	2–C	3/W	Diathermy. L. & G.
Amenorrhea	30	½–5	.....	30–15	....	2/W	Do not blister. G.
Appendicitis	30	½–5	¼–3	30–15	C	D	After surgery. L. & G.
Arthritis	20	½–5	¼–2	30–15	1–C	D	Do not blister. L. & G.
Asthma	20	½–5	.....	30–15	....	D-3/W	Do not blister. G.
Autointoxication	20	½–5	.....	30–15	....	D-3/W	Clean out colon. G.
Arteriosclerosis	20	½–5	.....	30–15	....	3/W	To increase general vitality. G.

Bartholinitis......	20	½–5	¼–3	10–5	1–C	D	Avoid blistering. L.
Boils.............	10	½–5	¼–3	30–15	2–C	D	Blister (see Furunculosis) L.
Bronchitis........	30	½–5	.....	30–15	....	D	Do not blister. G
Burns............	30	½–5	¼–1	30–15	2	D	Do not blister. L. & G.
Bursitis..........	20	½–10	¼–5	30–15	2–C	D	Blister. L.
Bubo............	20	½–5	¼–3	30–15	1–C	D	Blister lightly. L.
Bunions............		½–5	¼–3	20–10	1–C	2/W	Blister lightly. L.
Carcinoma (all locations)...	20	½–10	¼–5	20–10	2–C	D	Where possible cauterize, electrocoagulate, or dessicate first. Radium. L. & G.
Carbuncle........	20	½–10	¼–5	20–10	2–1	D	Have free drainage. L.
Catarrh (nasal)......		.....	.....	.....	....	....	See Hypertrophied Turbinates.
Cervicitis...........		1–5	3–10	10–5	Spec.	3/W	L.
Cellulitis (pelvic)..	30	3–10	3–6	Spec.	Spec.	D-3/W	Drain abscess. L. & G.
Cellulitis (surface).	30	2–10	½–3	20–10	1	D	Drain abscess. L. & G.
Cholecystitis......	30	2–5	½–3	20–10	1	D	For infections without calculi. L. & G.
Chorea...........	20	½–5	.....	30–15	....	D	Correct local conditions. G.
Chlorosis.........	20	½–5	.....	30–15	....	D	Persistence means success. G.
Chilblains..........		½–5	¼–3	20–10	1–C	D	Produce erythema. L.

DISEASE	RADIANT LIGHT Minutes	ACTINIC RAYS Time, Minutes		ACTINIC RAYS Distance, Inches		FREQUENCY	REMARKS
		A.C.L.	W.C.L.	A.C.L.	W.C.L		
Chancroid		.....	½–3	.....	1	D	Will not cure chancre. L.
Colitis	30	½–5	3–5	30–15	Spec.	D-2/W	Keep colon clean. G.
Constipation	20	½–5	.....	30–15	....	3/W	Use vibration. G.
Contagious diseases		.....	.....	.....	....	....	All are considered amenable but they require hospital treatment. L. & G.
Cutaneous T. B.		.....	.....	.....	....	....	See Lupus. L.
Cysts (local)		.....	½–3	.....	C	1/W	Drain. Produce inflammatory reaction. L.
Cystitis	20	½–5	2–6	30–10	Spec.	2/W	Through vagina or rectum. L. & G.
Dermatitis herp.		½–5	.....	20–10	....	3/W	Blister. L.
Diabetes mellitis	20	½–5	.....	30–15	....	D	Diabetic diet. G.
Duodenal ulcer	20	½–8	¼–3	20–10	1	D	Non-acid diet. L. & G.
Ductless-gland diseases	20	½–10	.....	20–10	....	D-2/W	Continue for several months. G.
Dysmenorrhea	30	½–3	.....	30–15	....	D	Four days before period. G.
Dyspepsia	20	½–5	.....	20–15	....	D	See Gastritis. Make better diagnosis. G.
Dysentery	30	½–8	.....	20–10	....	D	Blister lightly. G.

Eczema (all varieties)	20	½–10	¼–5	20–10	5–1	3/W	Correct diet. No aqueous applications. L. & G.
Empyema	30	1–10	.....	20–10	....	D	Drain if necessary. G.
Enterocolitis		.....	.....	.....	....	....	See Colitis. G.
Enuresis	20	½–5	.....	30–15	....	D-3/W	Produce hyperemia. G.
Epithelioma		.....	½–10	.....	1–C	D-2/W	Dessicate first. L.
Epididymitis	20	½–5	¼–3	20–10	1–C	D-W	Blister lightly. L.
Erosion of cervix		2–10	2–5	Spec.	Spec.	2/W	Blister lightly. L.
Erythema		½–5	.....	20–15	....	D-2/W	Blister lightly. G.
Erysipelas	30	1–10	½–5	15–10	2	D	Blister. L. & G.
Fatigue	20	½–5	.....	30–15	....	D	Do not blister. G.
Favus		1–5	½–5	10–5	1	3/W	Blister. L.
Felon	20	1–5	½–3	10–5	1	D	Drain. L.
Folliculitis	20	1–10	1–5	20–10	1	D	Blister. L. & G.
Furunculosis	20	1–10	½–5	10–5	1	3/W	Drain. L.
Gangrene	30	1–5	½–3	20–10	2	D	Stimulate heavily. L. & G.
Gastric ulcer	20	1–10	½–3	20–10	1	D	Must be persisted in. G.
Gastralgia		.....	.....	.....	....	....	See Gastric Ulcer.
Gastritis		.....	.....	.....	....	....	See Gastric Ulcer.
Gleet		2–10	½–5	Spec.	Spec.	D	Through rectum. L.
Gout	30	½–5	¼–3	30–15	2	D	Colchicine gr. 1/100. L. & G.

DISEASE	RADIANT LIGHT	ACTINIC RAYS				FREQUENCY	REMARKS
	Min-utes	Time, Minutes A.C.L.	Time, Minutes W.C.L.	Distance, Inches A.C.L.	Distance, Inches W.C.L.		
Goiter		2–5	½–2	15–5	1	2/W	Radium. L.
Gonorrhea	20	1–10	¼–5	Spec.	Spec.	D	Expose mucous membranes as much as possible. L. & G.
Gonorrheal arthritis	30	1–5	¼–2	20–10	2	D	Produce erythema. L.
Granulation tissue	20	½–5	¼–1	20	2	D-2/W	Do not blister. L.
Gunshot wounds	30	½–5	¼–3	30–15	5	D	L. & G.
Hay Fever	20	½–5	2–4	20–10	1–C	D-3/W	Mostly through nose. L. & G.
Hepatitis	30	½–5	.....	30–15	....	D	Avoid blistering. G.
Heart Disease	10	½–5	.....	30–15	....	D	Usually infected etiology. G.
Hemangioma		½–10	¼–5	20–10	2	D	See Sarcoma. Radium. L. & G.
Herpes progenitalis		1–5	¼–3	20–10	2	D	Blister. L.
Herpes zoster		2–10	1–3	10–5	1	D	Blister heavily. L. & G.
Hemorrhoids		1–5	1–3	Contact	Contact	2/W	Blister lightly. L.
Hysteria	20	½–5	.....	20–10	....	D	To sedate. G.
Hypertension	20	½–5	.....	30–15	....	D-2/W	See Nephritis. G.
Ichthyosis	30	1–10	1–5	15–10	1	D	Blister heavily. G.
Infections	30	½–5	¼–3	25–10	2	D	Blister heavily. L. & G.

Injury	30–60	½–5	¼–3	30–10	1	D	After surgery. L. & G.
Insomnia	30	½–3	.....	30–15	....	D	Slight erythema. G.
Impetigo-contagioso	10	½–10	¼–3	15–5	2	D	Blister heavily. L. & G.
Ischio-rectal abscess	30	½–5	¼–3	10–5	1	D	Avoid blistering. Drain. L. & G.
Keloid		5–10	1–5	5–C	C	W	Blister heavily. L.
Laryngitis (acute)	30	½–5	.....	30–15	....	D	Do not blister. L. & G.
Laryngitis (chronic)	30	½–5	¼–1	10–5	2	3/W	Blister lightly. L. & G.
Leukemia, splenomedullary	20	½–5	.....	20–10	....	D	Do not blister. G.
Leucorrhea		2–8	2–5	Spec.	Spec.	3/W	Make proper diagnosis. L.
Lichen simp	20	2–10	½–3	20–10	2	3/W	Blister slightly. L. & G.
Lichen planus	20	1–10	½–3	15–5	2	3/W	Blister slightly. L. & G.
Lupus ery. or vulg	20	2–10	1–5	10–5	1	2/W	Blister heavily. L. & G.
Lumbago	30	½–5	¼–1	10–5	1	D	Produce erythema. L. & G.
Lymphangitis	60	1–10	½–3	10–2	2	2/D	Rapid results are necessary. L. & G.
Marasmus	20	½–5	.....	30–15	....	3/W	For stimulation. G.
Nævi (all kinds)		2–5	1–3	Contact	Contact	W	Blister heavily. L.
Neisserian		.....	.....	.....	....	....	See Gonorrhea. L. & G.

DISEASE	RADIANT LIGHT Minutes	ACTINIC RAYS Time, Minutes A.C.L.	W.C.L.	Distance, Inches A.C.L.	W.C.L.	FREQUENCY	REMARKS
Nephritis	20	½–5	.....	30–15	....	D	Avoid blistering. Use auto-condensation. G.
Neuralgia	30	½–10	¼–3	20–10	1	D-3/W	L. & G.
Neurasthenia	30	½–5	.....	30–10	....	D	Do not blister. G.
Neuritis	20	½–5	¼–3	15–5	2	D	Blister if necessary. L. & G.
Onychia	20	½–5	¼–3	10–5	1	D-3/W	Blister slightly. L.
Orchitis	45	1–5	¼–2	10–5	2	D	Support. L.
Osteomyelitis	45	½–10	¼–3	10–5	2–C	D	After drainage. L. & G.
Ovaritis	30	½–5	¼–2	20–10	Spec.	D-3/W	Mag. sul. tampons. L. & G.
Ozena	.....	.....	1–3	.....	1–C	D-3/W	After scabs are removed. L.
Pancreatitis	30	½–10	.....	20–10	....	D	Heavy treatments. G.
Periostitis	30	½–5	¼–3	10–5	1	D	Open abscess. L. & G.
Pelvic Cellulitis	.....	.....	.....	.....	....	....	See Cellulitis
Phlegmasia alba dolens	30	½–5	¼–3	20–10	Spec.	D	Avoid blistering. L. & G.
Pharyngitis	.....	1–5	1–2	3	1	D	Through mouth. L.
Phlebitis	45	½–8	¼–3	20–10	1	D	Elevate. L. & G.
Pott's Disease	30	½–8	¼–3	20–10	2	D-1/W	Surgery, if necessary. L. & G.
Prostatitis	.....	.....	1–2	.....	Spec.	D-3/W	Use massage. L.

Prostatic hyper.	.....	.....	.....	.....	....	....	Radium. See prostatitis. L.
Proctitis		.....	1–3	.....	Spec.	D-3/W	Astringents. L.
Pruritis ani		2–10	¼–3	10–5	2	3/W	Study etiology. L. & G.
Pruritis vulvæ		2–10	¼–3	10–5	2	3/W	General treatments for etiology. L. & G.
Psoriasis	20	2–10	½–3	10–5	2	D-2/W	Auto-therapy. G.
Pyosalpinx	30	½–8	2–5	20–10	Spec.	D-2/W	Surgery, if indicated. L. & G.
Pyonephrosis	30	½–8	.....	20–10	....	D-2/W	Surgery, if indicated. G.
Rheumatism	30	1–8	¼–2	20–10	2	D	Study etiology. G.
Rheumatism (gonorrheal)	45	½–10	¼–3	10–5	2	D	Diathermy. L. & G.
Rhinitis atrophic	20	.....	2–4	.....	1-C	3/W	Through nose. L.
Rhinitis hyper.	20	.....	2–4	.....	1-C	3/W	Through nose. L.
Rhinophyma	20	1–8	½–3	20–10	1	2/W	Blister heavily. L.
Rhinoscleroma	20	1–8	½–3	20–10	1	2/W	Blister heavily. L.
Rosacea	20	1–8	½–3	20–10	1	2/W	Blister heavily. L.
Salpingitis	30	½–8	2–5	20–10	Spec.	D-2/W	Surgery if indicated. L. & G.
Sarcoma	20	1–10	½–5	20–10	2	D	Radium first. L. & G.
Sciatica	30	½–5	¼–2	20–10	1	3/W	Study etiology. L. & G.
Scrofulosis (T. B.)	...	.....	.....	.....	....	....	See Adenitis. L.
Seborrhea	20	1–5	½–2	10–5	1	3/W	Blister. L.

DISEASE	RADIANT LIGHT Minutes	ACTINIC RAYS Time, Minutes A.C.L.	W.C.L.	Distance, Inches A.C.L.	W.C.L.	FREQUENCY	REMARKS
Septicemia	30	1–10	½–2	10–5	2	D	After surgery. L. & G.
Sinus Infection	45	1–10	½–3	10–5	1	D	Maintain drainage. L. & G.
Sigmoiditis		.....	.....	.....	....	....	See Colitis. L.
Syphilis		.....	.....	.....	....	....	Slight aid only. L. & G.
Sycosis		2–10	½–3	10–5	1	3/W	Clip hair. L.
Synovitis	30	1–8	¼–2	10–5	1	D–W	Persist. L.
Telangiectasis		3–10	1–3	10–5	1	W	Must blister heavily. L.
Tetanus	30	2–10	½–3	10–5	1	D	Blister area then give general treatment. L. & G.
Tendosynovitis	20	2–5	½–2	10–5	2	D	Blister heavily. L. & G.
Tinæ (all varieties)		½–10	¼–2	10–5	2	D-3/W	Blister. L.
Tonsilitis		.....	1–2	.....	1–C	D	Through mouth. L.
Tonsils hyper.		.....	1–3	.....	1–C	2/W	Clean out infection. L.
Tuberculosis—							
1. Laryngeal	20	½–10	½–2	10–5	1–C	D	Cross fire. L. & G.
2. Bone and joints	30	1–10	½–3	20–10	2	D	Surgery when needed. L.&G.
3. Glands	30	1–10	½–3	20–10	2	D-2/W	Lance abscess. L. & G.
4. Peritoneal	30	1–10	.....	20–10	....	D-2/W	Paracentesis if necessary. G.
5. Pulmonary	30	1–10	.....	20–10	....	D-2/W	Plus recognized treatments. L. & G.

6. Rectum	20	1–10	1–5	20–10	Spec.	D	L. & G.
7. Skin	20	2–15	½–5	10–5	2	2/W	Use no ointment. L.
Turbinates hyper.	....	.....	1–5	.....	1–C	2/W	Through nostril. L.
Ulcers—							
1. Chancroid		.....	.....	.....	....	....	See Chancroid. L. & G.
2. Duodenal		.....	.....	.....	....	....	See Duodenal. L. & G.
3. Gastric		.....	.....	.....	....	....	See Gastric. L. & G.
4. Tubercular		.....	.....	.....	....	....	See Adenitis. L. & G.
5. Malignant		.....	.....	.....	....	....	Use cautery, electrocoagulation or radium. L. & G.
6. Syphilitic		.....	.....	.....	....	....	To increase local and general vitality. L. & G.
7. Varicose		....	.....	.....	....	....	See Varicose Ulcer. L. & G.
Urticaria	20	1–10	½–10	20–10	1	D	Use salines. G.
Urethritis		....	.....	.....	....	....	See Gonorrhea. L.
Varicose ulcers	30	2–10	½–3	20–10	1	D–W	Protect from irritation. L. & G.
Vaginitis		2–10	2–5	Spec.	Spec.	D-2/W	Mild antiseptics. L.
Vesiculitis		5–10	1–3	Spec.	Spec.	D-2/W	Through rectum. L.
Whooping cough	20	1–5	.....	20–10	....	D	Zone therapy. G.
Wounds	30	1–5	½–1	20–10	2	D	Dress aseptically. L & G..

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